# INTERNATIONAL RECORD OF MEDICINE

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ORIGINALLY PUBLISHED AS AMERICAN MEDICAL INTELLIGENCER, FOUNDED PHILADELPHIA, 1837

SYMPOSIUM ON THE HISTORY OF AMERICAN MEDICINE
PART I

Introduction: The Spirit of American Medicine — FELIX MARTI-IBAÑEZ
Guideposts in the History of American Medicine — BENJAMIN SPECTOR
Medicine and Medical Practices among Aboriginal American Indians — JOHN DUFFY
Diseases and Medical Practice in Colonial America — JOHN B. BLAKE
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Malignant Thymoma: Presentation of a Case — FREDERICK P. LOPRESTI, JOSEPH I. ECHIKSON, AND EDWIN H. ALBANO

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The Symposium on Medicine and Writing that appeared in the November 1956 issue of INTERNATIONAL RECORD OF MEDICINE has been published recently as a Monograph. The articles included in this Monograph are: "The Editing of a Modern Medical Textbook" by Russell L. Cecil; "Plain Talk and Clear Writing" by Morris Fishbein; "The Principles of Bibliographic Citation" by John F. Fulton; "The Art of Communication" by Joseph Garland; "On Writing a History of Medicine" by Douglas Guthrie; and "Minerva and Aesculapius: The Physician as Writer" by Félix Martí-Ibáñez.

This 72-page Monograph is sold for $3.00. As the fourth in the series of MD International Symposia, this book is the companion piece of *Medical Writing*, which was published in May 1956.

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SYMPOSIUM ON THE HISTORY OF AMERICAN MEDICINE

PART I

Introduction

# The Spirit of American Medicine

*Félix Martí-Ibáñez, M.D.*

PROFESSOR AND DIRECTOR OF THE DEPARTMENT OF THE HISTORY OF MEDICINE, NEW YORK MEDICAL COLLEGE, FLOWER AND FIFTH AVENUE HOSPITALS; EDITOR-IN-CHIEF, MD MEDICAL NEWSMAGAZINE, NEW YORK, N. Y.

## MAN AS HISTORY

"Man is not only nature but history," said the German philosopher Wilhelm Dilthey in his famous letter to the Duke of York. Nowadays historians as well as philosophers agree that the category of values represented by the "historical persona" of man is in a certain way superior even to his own biological values. For though man's nature gives him his biological being, his history, on the other hand, that is to say, his work, justifies him as a social entity. Hence the medical historian is increasingly concerned with the study of man as a problem in medical anthropology and with the study of medicine as a *social* science employing the methods of the natural sciences.

While man is eminently history, peoples are even more so. Every fragment of our planet, every one of those portions of the world we call nations, is a composite of land and people. The land is not, however, space alone but—what is even more important—time. Each land is at a different stage of culture or civilization in accordance with the cultural development of its inhabitants. It is not enough to speak of a country as an entity crystallized in its national characteristics; it is necessary to contemplate it as a moving force.

The dynamic concept of human life as movement and work, not only in space but also in time, must be applied to peoples also. Likewise, just as medicine today interprets disease as a pathological accident grafted onto the individual biography and studies it as a dynamic process indissolubly bound up with the life of the individual, so too must history interpret for us the reason for the rise or fall of a nation as a resultant of its course through time.

Part II of this Symposium will appear in the July issue; part III, in the August issue.

## AMERICAN MEDICINE TODAY

American medicine today is indisputably leading in technological progress, development of some specialties, scientific research, and medical communication; in public health and social hygiene, it stands among the leaders; and when certain still existing gaps are filled, for instance, the lack of encyclopedism in professional training, it may also take a leading place in medical education.

Today the American physician has perhaps the best opportunities in the world for learning and for advancing in his profession. But in order to be able to fulfill his task with dignity and efficiency, he must know the history of medicine in his country. He must be acquainted with its social and psychological trends, with its correlation with the great historical streams that nurtured the evolution of the United States, and with the struggles and achievements of the great figures in American medicine. He must, in short, be aware of everything concerning the turbulent, dynamic past of medicine in this country, if he wishes to comprehend its majestic present and its prospects for the future.

The American physician, often more familiar with the history of European medicine than with that of his own country, must learn to fit his knowledge and his work within the huge but simple frame of the historical evolution of American medicine. To do so would afford him a clear perspective in time and space and give his work and thought a double dimension of universality and eternity, which clinical work alone can never give him.

## PLAN AND PURPOSE OF THIS SYMPOSIUM

It is now two years since we first began to organize this Symposium for the purpose of assembling the learning and thought of the outstanding figures in the field of American medical historiography. From the brilliant galaxy now gathered here, some distinguished historians are unfortunately missing through pressure of work, absence, illness, or death, as in the case of the beloved and irreplaceable master, Henry Sigerist; but those present here have unstintingly given of the knowledge and thoughts garnered in their lifetime regarding the basic themes of American medicine.

We have deliberately refrained from giving this Symposium a rigid textbook form with each subject strictly confined within its own chapter, preferring instead certain individual freedom in the selection and development of topics. Nor have we feared the repetition of concepts, data, and situations, since deliberate repetition lucidly made is the foundation of proper instruction. Perhaps when it appears in book form, we may enhance this Symposium with chronologies and appendices to make it a complete, instructive, and inspiring survey of the physicians and the medicine of this vast land, which so many have rightly called the Land of Promise.

The plan of the Symposium ranges over a series of works and writers the simple enumeration whereof has the electrifying effect of a clarion call to History. Let us now review briefly this list of fascinating subjects and of authors as distinguished as they are devoted to their chosen work:

1. "Guideposts in the History of American Medicine," by Dr. Benjamin Spector.

2. "Medicine and Medical Practices among Aboriginal American Indians," by Dr. John Duffy.
3. "Diseases and Medical Practice in Colonial America," by Dr. John B. Blake.
4. "Medical Education and Medical Schools in Colonial America," by William Dosite Postell.
5. "Medicine in the Era of the American Revolution," by Dr. William F. Norwood.
6. "The Lessons of the War between the States," by Professor Courtney R. Hall.
7. "The Evolution of American Medical Literature," by Dr. Norman Shaftel.
8. "The Evolution of Medical Research in the United States," by Morris C. Leikind.
9. "A Brief Sketch of the Rise of American Medical Societies," by Dr. W. B. McDaniel, II.
10. "The Nineteenth Century American Physician as a Research Scientist," by Mrs. Phyllis Allen Richmond.
11. "Trends in American Public Health from the Colonial Period to the Present," by Dr. George Rosen.
12. "American Medicine in the World Today: An Historical Perspective and Reappraisal," by Dr. Ralph H. Major.

It was not the purpose of this Symposium to make a synthesis of the multiple facets of American medicine, or to plait the many-colored threads of its separate components into a single braid. We preferred to let each writer open his window upon the vast grandiose field of American medicine and reflect in the mirror of his own mind the men, facts, places, and things that have made it grandiose. The reader will be able therefore to select his own favorite subjects or, after reading the whole Symposium, to effect his own mental synthesis, which after all is the best thing.

As a corollary to the present Symposium we may offer in a future volume the historical and philosophical perspectives of American medicine, what it was, is, and can become in scientific research, professional practice, medical education, and public health, and also its correlation with the sciences, arts, and economy of American society, and with international medicine. Such a task might help forge fresh bonds with other countries overseas, bonds that are indispensable if we wish medicine to add to its noble mission the function of ambassador of peace among peoples at present separated by distrust, but who could yet be united by a mutual endeavor to forge a healthier and more universal civilization.

### ON THE BIRTH OF AMERICAN MEDICINE

American medicine was born on American soil; it is not as in Europe a continuation of previous autochthonous cultures. American medicine, like American culture and art, is of recent origin, for it is but a few centuries old. It was only in the sixteenth century that the first book on medicine in the Western hemisphere was printed and that was in Mexico by Spaniards. The importation into America of seventeenth-century European medical culture never succeeded in creating a medical "past" so solid as to bear upon the present with the force it still exerts in Europe. The result is that here it is easier to rebel and become emancipated from previous generations and their doctrines. Medicine in the United States has been optimistic

from its beginning, perhaps because of its youth. Even some techniques to which the United States owes its spectacular progress were conceived in Europe largely during the eighteenth and nineteenth centuries, when this country was barely being born as a nation. In this great nation where everything is young, there has come about in medicine, as in everything else, a repristination or rejuvenation of ancient races, particularly of the European stock. There, in my opinion, we have the roots of one of the secrets of America's greatness—and also of one of its greater historical problems.

All human life is basically work and invention. We have to invent our own existence, and such invention cannot be a matter of caprice. If we apply here the basic concept of Ortega y Gasset's philosophy, we understand that life is work and that work in life must be directed toward what must be done and not just anything. Each particular person can possess only his own virtues, not those of his neighbor. The same happens with nations. Europe's virtue is its being old and enjoying therefore a long history and long memories. The United States, however, possesses the admirable simplicity of youth and still shows, in medicine as in technology, traces of its original "colonial" psychology.

### THE "COLONIAL" SITUATION

How important this "colonial" character was, in time and space, in determining the future shape of the United States has not been stressed sufficiently. Colonial life—not modern "imperialist" colonialism but old-fashioned colonialism, a blending of exploration, pioneering, adventure, and technological conquest—has been lavish in historical harvests. The advent of philosophy on the earth was a colonial achievement. Medical as well as general philosophy, supreme achievements of the Greeks, did not blossom in Greece itself in the sixth century B.C. but in Greece's Asian and Italian *colonies*. In those very colonies, not in the Greek peninsula, were born not only the first great Greek philosophers, but even the two greatest figures of Greco-Roman medicine: Hippocrates and Galen.

Colonial life was of supreme importance in forging the future shape of medicine in this country. A characteristic of colonial life is that it is not autochthonous, and the settler is not indigenous to the geographical space in which he lives.

As we said before, land is not only space but time, and each land is at a different stage of civilization in accordance with the cultural "time" of the people inhabiting it. Space and time are as inseparable in geography and history as they are in physics. In the United States there occurred in both medicine and history the inverse of what happened to the Nordic "barbarians" who invaded the old and overcivilized Roman Empire. The barbarians had little or no historical background; therefore, they had only benefits to reap. But the United States was a land historically young, while the people that flocked to it derived from old and highly advanced nations. These people were spiritually rejuvenated upon coming in contact with this land less civilized but younger than theirs. The first physicians, like the first explorers, traders, lawyers, statesmen, and soldiers, to travel the majestic, rolling, promise-filled spaces of America came face to face with races of an inferior culture, which filled them with superiority, but also with loneliness.

A century later other European, or European-educated, physicians arrived with

concepts, techniques, and instruments numerous and efficient, only to find out that colonial America's problems were very simple. While colonial life is a bountiful life, historical life (from which these men or at least their professional education originated) was and is always precarious and subject to the dictates of destiny. The first physicians, surgeons, and clerics functioning as physicians had to face, then, problems easier, even primitive, but much more urgent than any they had encountered in Europe. The future United States was not yet a country but a historical *situation*, not a nation but a colonial state.

### THE MAGNIFICENT HASTE

The American colonies proceeded with keen determination to face the two great situations posed by history: primitive colonial life; and the vertiginous growth of the country proportionate to the rapid progress in locomotion, industrial development, and the expansion westward by the pioneers. Thus they relived in a concentrated and vertiginous form, as in a motion picture, all the stages that had taken centuries in Europe. In medicine, they passed through the equivalent of medieval clerical medicine with Cotton Mather and the cleric-physicians; they employed magic, astrology, superstition, and folklore, as was done in the lower Middle Ages; in Virginia, young physicians were apprenticed to their elders who taught them and even boarded them in their own homes, as had been the custom in ancient Greece; they performed empirical heroic surgery during the Indian wars and the War of Independence, just as the barber-surgeons and the contemporaries of Ambroise Paré had done in the Renaissance; and in the Middle West they had "factories" that turned out physicians practically overnight, just as "Thessalus and his jackasses" had done in Imperial Rome.

The passage of the years led inevitably to greater historical maturity but did not diminish the craving to go full speed ahead, nor the magnificent pace of the new continent, nor the effort, like Proust's, "to make up for lost time," to cover by leaps and bounds in a few years what had taken many centuries in the old continent. The elements against which conquistadors and pilgrims had had to struggle were mastered; the virgin territories opened up by the pioneers were peacefully settled; the aboriginal races were completely subjugated; the Western frontier was thrust as far as the blue waters of the Pacific; the entire country was crossed by a network of railroads; independence was heroically wrested by force of arms from the British; political differences between the North and the South were washed out in a bloody civil war; industrial progress reached a zenith; huge cities sprang up everywhere—thus the United States marched forward, always at full speed, always in a hurry. The *festina lente*, the "make haste slowly" of the Romans, meant nothing in the young continent. Instead, to hasten haste, to accelerate acceleration, to run fast without fear of exhaustion, to do things quickly but well—such was the supreme goal of the American people.

### THE PIONEERING SPIRIT

From the very beginning medicine played an active part in this welter of creative haste. Physicians flourished in private practice and teaching centers, in public

health programs and research centers. Sacrificed on the altars of speed were values—not recovered yet—such as tradition, a stumbling block on the fast road to progress, and cultural encyclopedism, which, like a load of ballast, might impede the headlong flight of those who would rather jet straight up into the stratosphere than swing round sedately in less exciting but far more inspiring circles of culture.

The outcome of this effort is the dazzling panorama of present-day American medicine with its "typically American" triumphs, especially in the field of antibiotics, an American specialty despite its British origin; in psychosomatic medicine, again American in its rise but German in origin; in organ surgery, brought here to the highest degree of perfection in the nervous system; in the physiodynamic, metabolic, and organicistic approach to psychiatry, and in psychochemistry; in the application of nuclear and atomic physics to medicine; in the development of impressive physical instrumentation applied to medicine; and in public health and social rehabilitation programs.

If we put our ear to the chest of present-day American medicine, we still hear beneath its dazzling white jacket of technological progress the youthful heartbeat of the settler and pioneer, who knows that life is haste and that his problems admit no waiting and therefore theory must sometimes be sacrificed to practice. The spirit that moved the first medical pioneers to risk an ovariotomy without anesthetics in the Kentucky forests, to study gastric physiology experimentally beneath the open skies in the woods of Michilimackinac, to apply anesthetics without controls in operating rooms in Boston, to perform heroic operations in the Middle West because the patient could hardly wait for the benefit of experience and tradition—this spirit determined the two great traits of American medicine.

These two traits are the "colonial" spirit ("colonial" meaning exploring, adventurous, pioneering), that is to say, the yearning to reduce the complexity of medical problems to their most elementary lines and apply equally simple, bold, and speedy (that is, colonial, pioneering) solutions to them; and creative haste, the craving to do a great deal and do it quickly, to finish with it promptly so as to pass on to something else. This haste was the fruit of the spirit of a young pioneering nation, which learned how to speed up the construction of its buildings before the storm should strike; how to mind its cattle and harvest its crops before the wolves and frosts should come; how to forge new weapons before the enemy should attack; how to create a dynamic medicine so as not only to be on a par with the rest of the world but to excel them, while at the same time attending to the constantly increasing problems indigenous to a young nation in full growth.

These are, I believe, the psychological characteristics that explain the portentous rise and dynamic direction of American medicine. These are features of splendid and thrusting youth, today supplemented by the thought and deeds of many physicians, native and foreign, who have tinged American practice with the silver of maturity. This simple, vigorous, and impatient youth is what gives American medicine its finest characteristics. That dynamic historical youth of American medicine has rendered into splendid achievement, now in the fullness of scientific maturity, the promise that throbbed in the great heroic and adventurous days so brilliantly narrated in this Symposium.

# Guideposts in the History of American Medicine

*Benjamin Spector, M.D.*

PROFESSOR AND CHAIRMAN, DEPARTMENT OF BIOANATOMY, AND PROFESSOR OF THE HISTORY OF MEDICINE, TUFTS UNIVERSITY SCHOOL OF MEDICINE

BOSTON, MASS.

> We must welcome the future, remembering that soon it will be the past; and we must respect the past, remembering that once it was all that was humanly possible.
>
> George Santayana, 1863–1952

The fundamental mastering fact about the history of American medicine is that it developed a native, mature quality while under English, French, and German influences. In general, the outlook in medical practice was bifocal (Anglo-American) in the eighteenth century; symbiotic (Europo-American) in the nineteenth century; and uniquely pervasive throughout the world in the twentieth century.

In this paper, I shall draw broad strokes across the canvas of American medicine to the end that a fresh interpretation may be made of present-day medical practice. It is desirable at the outset, however, to bring into focus certain currents of activity during the latter part of the eighteenth and the early part of the nineteenth centuries that modified the growth and development of American medicine. Among these activities one must include the following: (1) the force of tradition, which may be exemplified by a reference to Bacon's *Offendicula*,[1, 2] namely—the reverence for antiquity and the authority of men; the acceptance of custom in preference to the progress of medicine; the affectation of ignorance; and the pretense to knowledge rather than recognition of the formula of man, the helper and interpreter of nature; (2) the principle of trial and error, typified by the development of "cults"; (3) the growth of cities, with their inevitable alteration of the social cultural pattern—industrial, electrical, and chemical—and their effects on medical progress. It is significant in this connection to note that Thomas Jefferson, Alexis de Tocqueville, and James Bryce thought that the development of cities would be injurious to the morals, health, and liberty of man. They knew only too well that curative and preventive medicine would have to come to grips with these factors as the social structure developed through the stages of agriculture, manufacture, machinofacture, and commerce; (4) the philosophy of the Enlightenment and of romanticism, which altered the complexion of medicine with their respective emphasis on the empirical method in science and on the oversoul in man; (5) the political fact of Jacksonian equalitarianism under the slogan, "Equal rights for all, special privilege for none," which worked against setting up efficient standards of preliminary education and thereby encouraged the formation of sects. These environmental elements made the practice of medicine an unstable *modus vivendi*, particularly during the period when pestilential diseases, fevers, agues, insanity, and the falling sickness occupied the attention of the populace and the physicians. Taking a quick glance backward, it is to be granted that American medicine had its blind spots and its dark alleys of

speculative thought; nevertheless, it was exemplary, in the fullness of time, in the courage, heroism, and humanitarianism shown in medical practice, teaching, research, and public health service.

Figure 1 will prove useful in visualizing some of the important factors that went into the making of American medicine. During the early part of the eighteenth century, for example, American medicine was the alter ego of British medicine, a vis-à-vis derivative.[3] As one surveys the hand of American medicine from the contributions of the clerics to the contributions of the cluster of sciences, one can trace the wave of intellectual growth from theology, to education, to science, and finally to medicine as a socioscientific enterprise.

During the colonial period, theocracy was in the saddle. The duties of the clergyman and the medical practitioner were often combined into what Cotton Mather referred to as the "angelical conjunction."[4–6] To mention the names of Jared Eliot, Cotton Mather, and Thomas Thacher is but to point up the fact that these divines frequently broke through the walls of theological insularity on those occasions when communities were faced with pestilential diseases. The rashness and officiousness of the physician at a time when disease was a disclosure of the wrath of God often evoked the comment recorded in the Apocrypha, Ecclus. 38:15, to the effect that "He that sinneth before his Maker, let him fall into the hands of the physician." Benjamin Franklin, in *Maxims of Poor Richard*, wrote, "God heals, the doctor takes the fee." It was the Reverend Thomas Thacher, indeed, who took a trembling walk with God when he published *A Brief Rule to Guide the Common People of New England How to Order Themselves and Theirs in the Small-Pocks or Measels*. This was first published in 1677–1678 as a broadside and represents the earliest medical document to be printed in America north of Mexico.[7, 8]

The training of physicians in colonial America followed the apprenticeship method. As late as 1833, James Fenimore Cooper gave this description:

> Elnathan Todd in time was removed to the house of the village doctor where he was to be seen sometimes watering a horse, at others, watering medicines, blue, yellow and red; then again he might be noticed lolling under an apple tree with Ruddiman's Latin Grammar in his hand and a corner of Denman's Midwifery sticking out of a pocket; for his instructor held that it is absurd to teach his pupil how to dispatch a patient regularly from this world before he knew how to bring him into it. This kind of life continued for a twelvemonth when he suddenly appeared at a meeting in a long coat of black homespun with little booties bound with uncolored calfskin for want of red morocco. Elnathan was now greeted with his official appellation, Doctor Todd. Another year passed under the superintendence of the same master during which the young physician had the credit of "riding with the old doctor", although they were generally observed to travel different roads. At the end of that period, Dr. Todd attained his legal majority.[9]

The better-trained physicians possessed books in their library that reflected the European patterns of thought. The absence of any international copyright law favored the translations of books from authors of the Edinburgh, French, and German schools. Witness the following examples: *Anatomy:* Cowper, Cheselden; *Physiology:* Haller, Blumenbach; *Surgery:* LeDran, Pott; *Midwifery:* Smellie; *Medicine:* Boerhaave, Sydenham. It was not too long, however, before American medical literature emerged with the work of Morgan, Shippen, Wistar, Draper, Bigelow,

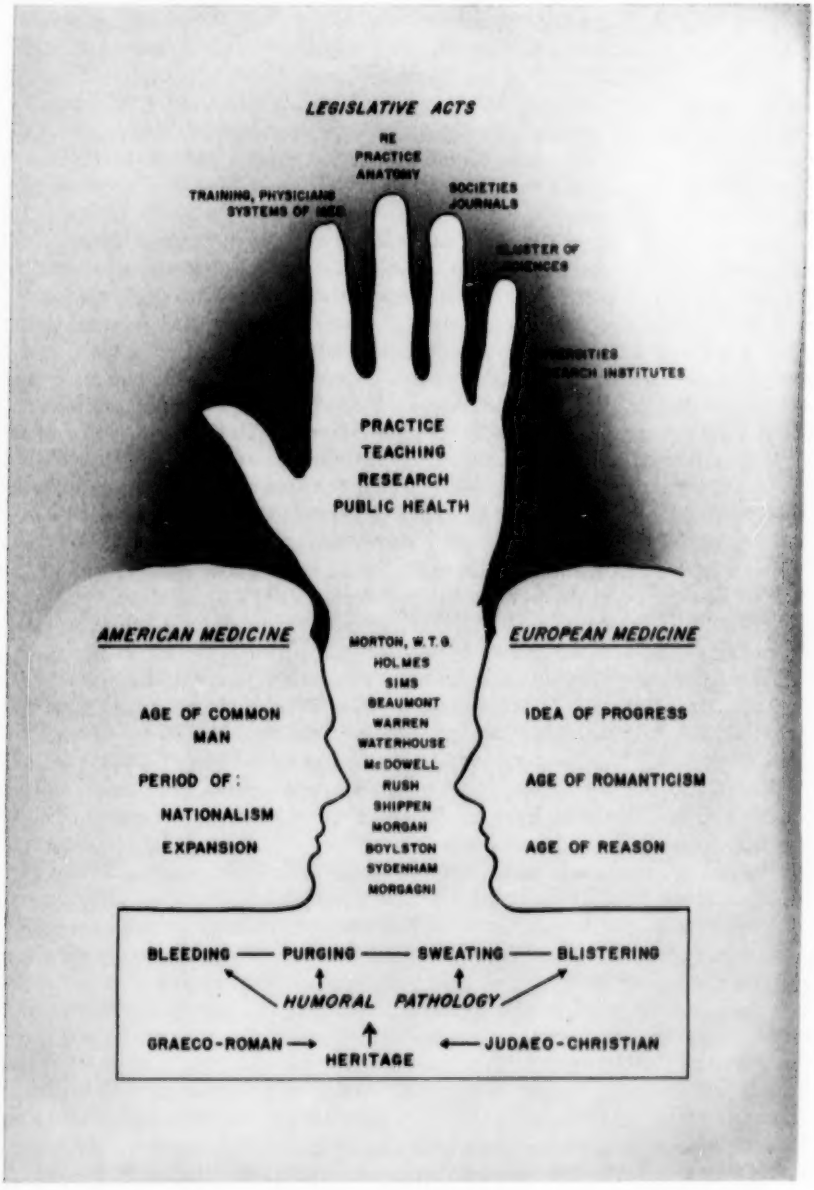
LEGISLATIVE ACTS
RE
PRACTICE
ANATOMY
TRAINING, PHYSICIANS
SYSTEMS OF
SOCIETIES
JOURNALS
CLUSTER OF
SCIENCES
RESEARCH INSTITUTES
PRACTICE
TEACHING
RESEARCH
PUBLIC HEALTH
AMERICAN MEDICINE
AGE OF COMMON
MAN
PERIOD OF:
NATIONALISM
EXPANSION
MORTON, W.T.G.
HOLMES
SIMS
BEAUMONT
WARREN
WATERHOUSE
McDOWELL
RUSH
SHIPPEN
MORGAN
BOYLSTON
SYDENHAM
MORGAGNI
EUROPEAN MEDICINE
IDEA OF PROGRESS
AGE OF ROMANTICISM
AGE OF REASON
BLEEDING
PURGING
SWEATING
BLISTERING
HUMORAL PATHOLOGY
GRAECO-ROMAN
HERITAGE
JUDAEO-CHRISTIAN

FIGURE 1.

S. D. Gross, J. C. Warren, Drake, Chapman, Gerhard, Isaac Ray, Coxe, and others. It is interesting to observe that during the last quarter of the eighteenth century, 51 books were published, while during the first half of the nineteenth century, 492 books appeared, and during the third quarter of the same century, 633 books were printed.[10, 11] This fact points up the increase and diffusion of knowledge in the early growth and development of medicine. Most of this activity took place in the middle states, particularly at Philadelphia, New York, Boston, Cincinnati, New Orleans, and Baltimore.

The romantic period of American medicine may be placed roughly between 1775 and 1840.[12] It was characterized by a marked display of imagination rather than reason. The French and American Revolutions in the political field, the laissez-faire attitude in economics, the concept of democracy in the area of political theory —all these were expressions of thought and action that had their impact on the quality and quantity of medical practice. The seminal ideas of nature, human nature, and society constituted a triumvirate that affected medicine along with other fields of the arts and sciences. Furthermore, one cannot neglect the importance of the surging notion of nationalism. The importance of the individual, as emphasized in the literary writings of Irving, Poe, Cooper, Thoreau, and the transcendentalists, gave a romantic stamp to medicine. The same spirit that activated these authors also stirred those who wished to write on medical subjects. Perhaps this was one of the more important reasons why medical sects and medical systems appeared in such profusion. There was romance in the botanical and chemical schools, in Thomsonianism, in homeopathy, and in phrenology, for they all argued that their system was a key to the understanding of human nature and human disease.

The population of continental United States increased from 3.9 million in 1790 to 12.8 million in 1830 and to 62.9 million in 1890. The immigration rate rose from about 400,000 in 1800 to 1,500,000 in 1850. The growth of cities from 1800 to 1845 may be appreciated from the following increase in numbers: New York, from 60,000 to 371,000; Philadelphia, from 70,000 to 258,000; and Boston, from 24,000 to 114,000.[13, 14] These factors brought new problems to cities, which, in turn, molded the practice of medicine and called for legislative enactments to protect the health of the people. The "rise of the common man" in the 1830's brought about a leveling effect on all classes of people, including the medical profession.[15–19]

Under common law the practice of medicine was open to all who desired to follow it in any of its branches, subject only to liability for damages in a case of lack of skill on the part of the practitioner, and the right of the government to proceed by quo warranto to prevent incompetents from following the profession.[20] With this background, it was beyond the power of the state to prohibit the practice of medicine and surgery or any of its limited systems in the absence of any showing of injury or tendency of injury to the public health, safety, or morals. It was not a felony, for example, to treat the sick with their consent and with honest intention, no matter how ignorant one was of the quality of the remedies used. Such court opinion gave considerable impetus to quacks. A serious attempt to modify the existing widespread cultism began in 1844, when Justice Holmes ruled that "good intentions constitute no ground for the privilege of endangering human life." In

the middle of the nineteenth century, there were almost no legal restrictions in the practice of medicine in most states of the Union. Many regular and irregular physicians presumed that there was an inherent right to practice medicine—one form of interpretation of the doctrine of natural rights. Herbert Spencer, for example, objected to laws securing the public health at the expense of individual freedom. In the United States, no one had a natural, absolute right to practice medicine: it was a conditional right subject to the approval of a physician, an incorporated medical society, a diploma from a medical faculty of a university, or a license from a board of medical registration.

Just as important as the licensing of physicians was the problem of securing material for the promotion of anatomical science. The history of this matter was charged with emotion, prejudice, religion, and morality. The Anatomical Act of 1831 of Massachusetts, for example, will always remain a landmark of American medicine.[21] This act was a mark of political wisdom and humanitarianism, for it severed, once and for all, the former association with godlessness. Today, anatomical acts represent beneficent, humanizing instruments in fostering the health of the people, for only by the dissection of the dead can one understand the fabric of the living.[22, 23]

In a growing country, the formation of societies and the publication of periodicals and textbooks are a *sine qua non* for the continued advance of medicine. Such vehicles of knowledge were represented in the mid-nineteenth century by the American Academy of Arts and Sciences, the *Transactions of the American Philosophical Society*, the College of Physicians of Philadelphia, the Boston Society for Medical Improvement, the Pathological Societies of New York and Philadelphia, and the New York Academy of Medicine.[24] It will astonish no one to learn of the lack of medical publications during the first century of American medicine, since physicians were too much occupied in the making of a living. Nevertheless, printings appeared as a broadside, as pamphlets and textbooks in fields as varied as smallpox inoculation, medical education, introductory lectures in hospitals, medical history, medical ethics, military surgery, yellow fever, epidemiology, vaccination, obstetrics, American medical biography, digestion, self-limited diseases, puerperal fever, ether anaesthesia, medical geography, and appendicitis. In a real sense, this is an arresting survey of topics, and it calls to mind successively the names of Thomas Thacher, Zabdiel Boylston, John Morgan, Thomas Bond, Peter Middleton, Samuel Bard, John Jones, Benjamin Rush, Noah Webster, Benjamin Waterhouse, Ephraim McDowell, James Thacher, William Beaumont, Jacob Bigelow, Oliver Wendell Holmes, William Thomas Green Morton, Crawford Long, James Marion Sims, Daniel Drake, and Reginald Heber Fitz. In this connection, the following early medical journals merit mention: the *Medical Repository*, the *Philadelphia Medical and Physical Journal*, the *New England Journal of Medicine and Surgery*, the *Western Journal of the Medical and Physical Sciences*, and the *Transylvania Journal of Medicine*.[25–48]

In spite of all its limitations, the philosophical idea of progress provided considerable impetus, courage, and faith to the American physician to emancipate the public from the ravages of disease. It served as an intellectual fulcrum to displace the earlier lack of confidence in the public mind concerning therapeutic nihilism and

the extensive use of the lancet by the "regulars." Yale, Harvard, Michigan, and Johns Hopkins universities were leaders in furthering this belief in scientific progress. There was a deep-seated need to supply understanding of empirical medicine, particularly since the number of medical graduates almost trebled, from approximately 6000 to 18,000, in the period from 1830–1859. Considerable sound knowledge came from the cluster of sciences occupying the periphery of medicine. The localism of Morgagni, the cell theory of Schleiden and Schwann, the cellular pathology of Virchow, the postulates of Koch, the principle of conservation of energy of Helmholtz—these additions to current knowledge elevated the practice of medicine from the influence of the hospital ward and the deadhouse to the laboratory of the university. A strong parallel development was the creation of research institutes, of which the most outstanding was the Rockefeller Institute for Medical Research, founded in 1901. Others soon followed and lifted the whole field of medicine to ever-increasing horizons of development, such as in fields of chemotherapy and mass application of medical knowledge.[49–51]

Looking back over the span of about 175 years of American medicine, from the freedom gained under the Declaration of Independence to the contributions encompassed today in the totality of services represented by the American Medical Association, one must recognize the debt to the past and be mindful of the legacy of the present to the future. In this process, the American physician has justified the term "physician" as used in the Aristotelian sense and has, furthermore, given substance to the root derivatives of "physician," namely: *physikos* (scientist); *physiologus* (naturalist); *physika* (things physical), and *physike* (the art). If we wrap these aspects together in the warm balm of man's intellect and spirit, then the future advance of American medicine, in both its art and its science, is assured for all time.

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## N. I. H. Seeks Patients for Research

The National Institutes of Health is looking for patients in certain disease categories to participate in its clinical research activities. The new pediatric unit at the Cancer Institute wants patients with childhood neoplasms, leukemia and other blood dyscrasias, radiation-induced tumors, and sarcoma or other highly malignant tumors. Researchers at the Institute of Arthritis and Metabolic Diseases are interested in cases of gout, Boeck's sarcoid, osteoporosis, pheochromocytoma, cretinism, and Reiter's syndrome. A limited number of patients with essential hypertension, glomerulonephritis, myasthenia gravis, bacterial endocarditis, early glaucoma, and certain specified tumors are wanted by other research units at the N. I. H. A newly published booklet describing studies for which volunteer patients are needed, with admission requirements, can be obtained by physicians on request by writing to N. I. H. Clinical Center at Bethesda, Md.

# Medicine and Medical Practices among Aboriginal American Indians

*John Duffy*

DEPARTMENT OF HISTORY, COLLEGE OF ARTS AND SCIENCES, LOUISIANA STATE UNIVERSITY
BATON ROUGE, LA.

The path of the historian would have been much smoother if the aboriginal American Indians had possessed one unified culture pattern stretching from the Straits of Magellan to Hudson Bay, or even if the Indians living from Mexico northward had possessed cultural unity. As it was, there were hundreds of diverse tribes, differing widely in language, customs, and social, political, and economic organization. Adding further to the confusion, the Indian societies were in no way static: tribal movements, cultural diffusion, and various other factors were constantly modifying and changing the Indian ways of life. Hence the time factor necessarily enters into any discussion of the American Indians. Obviously the Indians encountered by De Soto and Cabeza de Vaca were quite different from those whom Lewis and Clark described some 250 years later. However, while it is true that the three centuries after the voyage of Columbus probably saw the most drastic changes in the Indian way of life, many tribes still existed relatively untouched by the influences of white civilization at the end of this period.

The failure of the Indians to develop written records and the rapid disintegration of their society after contact with Europeans leave but few avenues by which one may re-create their way of life. The first and most obvious of these is study of the accounts of explorers, travelers, and settlers. In evaluating their work, it is well to bear in mind that these men judged Indian medical practices in the light of their own medical knowledge, and a wide gap existed between the cultural background of sixteenth century explorers and those of the nineteenth century. Furthermore, personal opinions and prejudices entered into the picture. Many writers waxed eulogistic about the "noble red man," while others were predisposed to criticize the heathen savage, seeing little of merit in any of his institutions. Frequently, generalizations were made about the Indians on the basis of observations among one or two tribes, and only the most able writers were aware of the profound ways in which European influences were modifying and changing the Indian cultures. Bearing these factors in mind, it is readily apparent that drawing conclusions about aboriginal Indian medicine is a pastime fraught with peril.

From a medical standpoint, the early explorers and colonists who first encountered the Indians were not too many centuries in advance of the so-called savages. Although the science of medicine made vast strides in the years from 1500 to 1800, the practical application of this increasing body of knowledge was relatively slow. Herbs remained the basis of materia medica for much of the period, and theoretical concepts dominated medical thinking. The most widely accepted of these was the humoral theory set forth by Galen some 1500 years earlier, which postulated that sickness was the result of an imbalance of the four basic humors and that the aim of

medical treatment was the restoration of the proper balance. Operating within this framework, European medicine was only one step removed from that of the Indians, who ascribed virtually all sicknesses to the work of spirits, good or bad. However, there was one important distinction: Europeans had taken the major step of attributing sickness and disease to natural causes, whereas the Indians invariably looked to the supernatural.[1]

The picture of Indian medicine during the past three centuries has suffered considerable distortion as a result of what has been termed "the cult of the natural man." Many of the early writers about the new world were enthusiastic in their accounts of the native way of life. The Indians were described as strong, healthy, free of disease, and possessed of a tremendous fund of medical knowledge. They were also credited with knowledge of a vast number of medicinal herbs. Not all reports fell into this eulogistic pattern, but those that were most widely read presented an exceedingly sympathetic picture. The fabulous success of the Spanish conquistadors in the sixteenth century had fired the imagination of Europeans for more than two centuries, and nothing seemed impossible to them. Tales of possession by the natives of miraculous herbs seemed no more incredible than the shiploads of gold and silver arriving from the new world or the descriptions of its vast forests and fertile meadowlands.

At the time when contacts between whites and Indians were steadily widening, Europe was in the throes of the commercial revolution and the stresses and strains arising from emerging capitalism. The old feudal system had long since lost its *raison d'être*, and in France particularly, the cultural center of Europe during much of the colonial period, the aristocracy had degenerated into an effete, decadent, and artificial society. In searching for solutions to the pressing social and economic problems confronting society, European thinkers evolved the concept of the natural man—the individual living close to nature or God, free from the vices and restrictions of society, a simple and noble soul. The felicitous accounts of the American Indians, inspired in part by the desire of the colonial proprietors to people their vast land grants and in part by the authors' tendency to write what their readers wished to believe, were eagerly seized upon as proof of the natural goodness of man. By the early nineteenth century, the great age of romanticism, the cult of the natural man was fully developed and the noble red man emerged on the scene.

It was only logical that this Indian paragon of virtue in communion with nature would have learned her secrets. Through the Indian, the Europeans hoped to find a universal remedy among the herbs of the new world—and periodically such a panacea was discovered. At successive times sarsaparilla, maidenhair fern, and ginseng, three medicinal herbs of the Iroquois, were proclaimed as sovereign panaceas for human ailments, although each fell by the wayside after its brief moment of glory.[2] Nonetheless their history reflects the wishful thinking of Europeans in regard to Indian botanicals. By the time the anthropologists, ethnologists, and medical historians had studied Indian medicine and placed it in its right perspective, the myth of the Indian herb doctor was too well established as an American tradition to die easily.

Indian medicine was too closely identified with religion to be studied apart from it, and it is often overlooked that thaumaturgy rather than medication was the aim

of the Indian medicine men. Indian religion, which among most of the tribes had achieved a stage intermediary between animism and monotheism, was characterized by a Great Spirit ruling over a host of lesser spirits. These spirits were omnipresent, and it behooved the Indians to walk warily if they expected to keep and maintain economic prosperity, social well-being, and sound health. A host of taboos regulated Indian life, the breaking of any of which could lead to disastrous consequences. The medicine man represented a priestly intermediary class whose duties were to ward off the evil spirits and summon the good ones. Healing the sick was only one aspect of his work, since the medicine man was expected, among other things, to summon the rain and bring fortune to the hunters, success to the warriors, and good crops to the tribe. In a world controlled by spirits, some malicious, some playful, and all easily offended, man was certain to find himself beset with troubles. Whether his problems arose from famine, war, or sickness, supernatural forces were invariably at the root of the trouble. Under these circumstances, the medicine man had a dual function: first he had to divine the particular spirit involved, and second, he had to take measures to appease or defeat it.

The intimate connection between religion and medicine is shown in a fine summary of Indian etiological concepts made some years ago by Dr. Robert C. Major. After citing the example of the four classes of Ojibway medicine men and their respective powers and functions, Dr. Major listed the causes of disease under three main headings. First were those diseases caused by a spirit acting independently. The spirit could be a malevolent one acting capriciously or a benevolent spirit punishing the patient for having violated a taboo. Second, disease might be caused by a spirit acting at the behest of a human agent. Third, disease could be attributed to souls or human spirits. Here the sickness could be the work of an unhappy or offended spirit of a dead person, or it might arise from the loss of the sufferer's own soul. In the latter case, the patient's soul might have been taken by a spirit at the request of a human agent or it might have been separated accidentally from the patient while he was asleep.[3]

While Major's classification held generally true for the Indians, there were many local variations. James Mooney and Frans Olbrechts, in their study of the Cherokee, listed seven specific sources of disease: "spoiled saliva," dreams, enemies, spirits (fire, river, moon, for example), witches, neglected taboos, and contact with a menstruating woman.[4] However, whether the patient had offended the spirits directly or whether they were invoked by witches or enemies, the immediate cause of the pain and illness was always the action of a spirit. And it was only through the spirit world that the human agent could be identified.

In divining the offending spirits and appeasing or combatting them, the primary weapons at the command of the medicine man were incantations, chants, dances, medicine bags, amulets, talismans, and the other paraphernalia of magi and witch doctors everywhere. In addition, he resorted to the use of herbs and herbal concoctions, sucking, blowing, sprinkling, blood-letting, and other tactics useful in conjuring away illness. The medicine man's quest for symptoms bore little relation to modern medicine, since he was concerned primarily with the patient's dreams rather than his physical condition. In addition to delving into the patient's sub-

conscious, the medicine man interrogated him closely to determine if inadvertently he had broken one of the innumerable taboos, or if he had enemies who might be working against him. If the causal agent could not readily be identified, the medicine man then resorted to his distinguishing characteristic, his ability to commune with the spirit world. By means which, although varying from tribe to tribe and from medicine man to medicine man, ordinarily involved long fasting and dancing, the medicine man went into a trance, summoned his friendly spirit or spirits, and was thus able to solve the problem.

Once the diagnosis was made, the next step was the cure. Here again, religious or spiritual procedures were essential, although other methods were brought into play. In addition to the incantations, dances, and fetishes, the Indians frequently used medicines and techniques of therapeutic value, and it is this aspect of Indian medicine that is of concern to students of medical history. Determining the exact role played by herbs and therapeutic techniques in aboriginal Indian medicine, however, is no easy task. Anthropologists and ethnologists have long noted that contact with Europeans brings profound modifications to the medical practices of primitive tribes, particularly with respect to the role of religion in the healing process. John R. Swanton, in his study of the Creeks, observed that, with the arrival of the whites, the religious features of Creek medicine tended to diminish, while an increasing emphasis was placed on the administration of remedies.[5] As Indian healing shifted from the spiritual to the physical or pragmatic level, increasingly the influences of white folk medicine subtly pervaded Indian medical lore. In some instances, white medical practices were adopted with slight modification and are clearly discernible; in other cases, there is good reason to suspect a European origin, but the degree of modification is too great to permit positive identification.

There can be no doubt that Indians happily accepted the white man's medicines. The Jesuits found the administering of drugs to sick Indians to be one of the most effective ways to gain converts. Father Joseph LeMercier reported an epidemic among the Hurons in 1637 and declared that the Indians clamored for medicines. "Our medicines," he wrote, "produced effects which dazzled the whole country, and yet I leave you to imagine what sort of medicines they were! A little bag of senna served over 50 persons; and they asked us for it on every side; . . ."[6] A few years later, Father de Lamberville, among the Onondaga in what is now New York State, urged that supplies of medicine be sent out to him as a means of converting the sick. He declared: "It would be a bait wherewith to secure nearly all the dying. There are some who, when they find that they are given no medicine, turn their backs to me, and say that I have no pity on them; and after that they cannot be approached."[7] The French colonists in Louisiana, who were relatively well supplied with medical men, found it advantageous to keep good relations with the Indians by giving them medical assistance. In 1725 the Council for Louisiana voted to grant 300 livres and rations to provide a surgeon for the Alabama and another 200 livres to send a surgeon among the Yazoo.[8] However, this was actually a reciprocal relationship, since, in general, the settlers in all the colonies, French and English alike, were plagued by shortages of medical supplies and were not averse to calling on the Indians for help.

Despite the many complicating factors, students of Indian life are generally agreed that the Indians had little understanding of either anatomy or physiology. It is true that in the year 1492 Europeans could scarcely have been too critical of the Indians, but Western civilization was on the threshold of tremendous advances, whereas Indian medicine in these areas was to remain relatively static. John G. Bourke asserted of the Apache that their materia medica was limited and that they "prefer incantation to pharmacy at all times. . . ."[9] A student of the Cheyenne ways commented that although they used a number of herbal remedies, these were deemed only incidental to the real medicine, the charms, chants, amulets, and talismans.[10] The Chipewyan, according to Edward S. Curtis, attributed most sickness to the breaking of taboos, and relied almost exclusively on dancing and incantations for therapeutic action.[11] Two leading ethnologists have stated that although the Cherokee used many botanicals or simples of officinal value, their selection was purely accidental. "The rule," they wrote, "underlying the choice of a certain plant as an antidote against a given ailment is of a mythological and occult rather than of a natural nature."[12]

The conclusions of modern scholars are substantiated by the observations of many early travelers. James Adair noted in the eighteenth century: "The Indians deem the curing of their sick or wounded a very religious duty; and it is chiefly performed by their supposed prophets, and magi, because they believe they are inspired with a great proportion of the divine fire."[13] Lewis and Clark, who came into contact with many tribes on their expedition into the West in the years 1804 to 1806, declared of the Indians: "They never think of giving medicine, until they have first made an attempt to remove the disease by sacrifices and prayer; and if the patient recovers soon, it is attributed to the holy management of the priest; and if medicine is administered as a last alternative, they never administer it without its being accompanied with prayer, and a large quantity of meat, which they consume on the fire for a sacrifice."[14]

Granting an essentially irrational viewpoint toward medicine and healing and a limited understanding of anatomy, what medical problems confronted the Indians prior to the coming of the whites? There was almost unanimous agreement among the first Europeans to contact them that the Indians were generally healthy and remarkably free from diseases. William Wood, who lived in New England from 1629 to 1633, declared that the "Indians be of lusty and heathful bodies . . . [and] spinne out the threed of their dayes to a faire length, numbering three-score, four-score, some a hundred years before the world's universal summoner cite them to the craving Grave." In listing the complaints from which they were free, Wood named almost every sickness known to Englishmen of his day, including "Gouts, Stones, [and] Toothaches. . . ."[15] A French traveler in Louisiana in the mid-eighteenth century remarked of the Choctaw: "of course you see no Indian affected with the gout, the gravel, and other distempers which we are subject to in Europe; but this may likewise be attributed to their frequent bodily exercises. You see no great Dutch bellies there, nor any great tumours under the chin, as the Piedmontese wens."[16] At the turn of the nineteenth century, another French observer commented on the jet black hair and good teeth of the Indians, among whom, he said, it was difficult to recog-

nize the aged.[17] Lewis and Clark found the Plains Indians "all (except for the Snake Indians) tall in stature, straight and robust." Only rarely were deformed Indians encountered, and their teeth were always "large and white" without any signs of decay. The *Journal* contains an additional note, which arouses the curiosity of the reader: "They make but very little use of physicians and medicines, and consequently they have but few diseases among them." One wonders whether the seemingly inverted sentence structure was accidental, ironic, or simply a statement of fact reflecting a not uncommon viewpoint about the medical profession.[18]

Even today, the Indians are more susceptible than the whites to the major killer diseases of earlier days. This fact combined with the evidence of early observers leaves little doubt that the red men were free from the majority of epidemic diseases plaguing Europe and Africa.[19] Malaria may have been present, but, as with the case of syphilis, the evidence is inconclusive. The gout and gravel, two disorders widely prevalent in seventeenth and eighteenth century Europe, do not seem to have bothered the Indians, a fact which drew the attention of many observers. A modern anthropological study of the Southwest tribes bears out the historical evidence. The Indians were found to be unusually free of physical defects, with virtually no serious liver or kidney diseases, cardiac or arterial disorders, glandular affections, hernias, skin diseases, stomach ulcers, or cancers.[20] In his study of Indian medicine Dr. Eric Stone asserted that they had little experience with obesity, arteriosclerosis, heart disease, endocrine disorders, or insanity.[21]

The agreement among students of Indian life as to the ailments that did not trouble the Indians is paralleled by a similar agreement as to the nature of those that did plague them. Digestive complaints resulting from alternating periods of fasting and feasting were quite common. Almost every account of the Indians mentions the flux. However, flux was one of the most common complaints among the settlers, and it is likely that the whites brought new forms of the enteritides to prey upon the Indians. Since they lived an outdoor life, it was almost inevitable that constant exposure would lead to what was generally described as rheumatism and neuralgia, but which may have been rheumatoid or infectious arthritis. Apropos of these disorders, George Catlin, in his description of the Western Indians, wrote that most of their sicknesses arose from "inflammatory rheumatisms, and other chronic diseases."[22] The extent to which pleurisy, lung inflammations, and bronchial disorders affected the Indians is another debatable issue. Ample evidence exists of their presence after the coming of the whites, but whether they were affected to the same degree in pre-Columbian days is another matter. Conjunctivitis, attributed to living in smoke-filled longhouses and lodges, was prevalent among the older age group. Stone asserted that rickets was fairly common, although the evidence of the paleopathologists does not bear this out.[23]

The divergent economies of the Indian tribes necessarily point to the influence of diet on Indian health problems. While Indians in many tribes did have excellent teeth, there is considerable evidence in certain areas of dental caries and toothache, as well as pyorrhea with extensive alveolar resorption.[24, 25] Obviously, the degree to which the Indian food supply depended on agriculture or hunting would have a direct bearing on the condition of the teeth. Early Europeans were struck by the

absence of gravel and goiter ("Piedmontese wens"), yet in some geographic regions the Indians suffered from goiter and urinary calculi, just as the present white inhabitants do today.[26] Granting a few qualifications and a number of gaps in the picture, there can be little doubt that the Indians enjoyed good health as compared to the Europeans. It does not follow, however, that their life expectancy was any greater. A rigorous outdoor life, constant warfare, and the dangers of hunting were scarcely conducive to longevity. While young adult men probably bore the brunt of these losses, the alternating periods of feast and famine must have taken a toll of both young and old.

In terms of actual medical practice, the sum total of useful Indian medicines and medical techniques is surprisingly large. However, the medical lore of any given tribe was only a fraction of this total. Furthermore, many of the medicinal herbs were not administered correctly or used for the right purposes, while a number of others, especially emetics, purgatives, and narcotics, were used in conjunction with purely religious ceremonies. The practices of the Cherokee Indians are representative of both the best and worse features of Indian medicine in general. In preparing herbal remedies, the Cherokee pounded, steeped, or boiled the herb. No attention was paid to the dosage, and the patient was expected to drink as much medicine as his stomach would hold. Often a gallon or more per day was poured into the sick man. In view of the huge quantities of liquid ingested, it is small wonder that so many of the Indian herbs had an emetic effect. When the infusion or decoction was applied externally, it was usually blown or sprayed on the patient. Another Cherokee method of administering herbs, which was also common to the other tribes, was that of exposing the patient to the vapors of the herbs. The herbs were either burned directly in the patient's lodge or else a decoction or infusion was poured over heated stones in the sweat lodge.

Sweat baths, which have been described in detail by so many writers, were almost universal among the Indians. They served both as a means of gaining physical and spiritual purification and as a therapeutic device. Like the sweat bath, emesis was practiced extensively for religious and medical purposes. In fact, the Indians were as casual about resorting to emetics as the whites were about using laxatives. To induce vomiting, Indians used emetic herbs, drank huge quantities of warm water, or else applied such mechanical means as tickling the throat with a feather. While undergoing treatment from the medicine men, the Cherokee, like the other Indians, were subject to many taboos and restrictions on diet. Fasting was common, although occasionally it was carried to the point where it defeated its purpose. In some instances the patient was expected to fast all day, yet was permitted to gorge himself at sunset. A large number of the taboos were sexual in origin, relating to intercourse and contact with menstruating or pregnant women; hence they had little or no bearing on the sickness or cure.

Insofar as surgery was concerned, the Cherokee were much given to scarification, another practice widespread among the tribes. They had a limited knowledge of how to treat fractures. Ordinarily they attempted to straighten the bone and to apply a crude splint. Their handling of dislocations was essentially of the same nature: The patient's friends pulled on the rebellious joint until they thought it

was in place. Other than knocking out an occasional painful tooth with a stone or hammer, they performed no dental surgery. The care of wounds and boils left a great deal to nature. An infusion of bark of some type was blown over the wound, and little else was done. In cases of severe hemorrhage, a plaster of buzzard's down was used to stop the bleeding.

Like all primitive culture groups, the Cherokee had little foresight, and prophylaxis was almost nonexistent. Possibly this statement should be qualified, since the Cherokee, as well as the other tribes, were faithful in the performance of taboos and always carried skunk and buzzard charms to ward off sickness.[4]

Frederick W. Hodge, in his *Handbook of American Indians North of Mexico*, credits them with using the following methods of treatment: massage, pressure with hands, feet, sash, or cord, bone-setting, cutting, cauterizing, scarifying, cupping, bloodletting, poulticing, clysmata, sweat baths, counterirritants, sucking of snake bites and abscesses, and vegetable medicines. On the face of it, the list is fairly impressive, since it includes most of the standard procedures of the nineteenth century Europeans. However, Hodge was quick to point out that in practice, these remedies were not nearly as effective as it first might appear.[27]

Probably the Indian herbals attracted more attention from early writers than any other phase of Indian medicine. In the seventeenth and eighteenth centuries, the European pharmacopeia was based largely on botanicals, and it was natural that men of science should have wished to expand their knowledge in this area. Here again, though, the evidence is conflicting. While most accounts of the new world described it as rampant with valuable herbs whose medicinal qualities were well known to the Indians, more skeptical observers limited themselves to mentioning that the Indians knew several excellent remedies. By the nineteenth century, the first flush of enthusiasm was over, and more critical appraisals appeared. At the turn of the century the Chipewyan were described as having virtually no medicines except willow bark. "Of the use of simples and plants," it was observed, "they have no knowledge; nor can it be expected, as their country does not produce them."[28] A few years later a description of the Indians located west of the Mississippi stated: "Their remedies like their diseases are comparatively few. . . ."[29]

In actual fact, the Indians were acquainted with, and used in one form or another, hundreds of botanicals. However, the number of herbals in the medical lore of any particular tribe was not large, and frequently useful herbs were overlooked. David Bushnell, in discussing the herbals of the Choctaw, remarked: "It is rather curious that although the witch hazel (*Hamemelis virginica*) is plentiful in the region, the Choctaw appear not to have made use of it."[30] Aside from the limited knowledge possessed by the tribesmen of the botanicals in their own area, the wide variation in flora from region to region necessarily placed Indian medicine on a regional basis. However, varieties of many plants were widespread in North America and found their way into the pharmacopeia of many tribes—although they were not necessarily applied for the same purpose by each tribe.

The herbals of the Creeks included a species of yellow-flowered water lily used as an antifebrile. The leaf was applied directly to the patient's skin, and large doses of an infusion made from the leaves were taken internally. For intestinal

disorders, the Creeks made medicines from the angelica and the red or smooth sumac. The roots of the latter were boiled and the liquid taken internally for flux. The Creeks, like a number of other tribes, also used a decoction made from the boiled roots of the wild plum as another cure for flux. To relieve aching teeth, the inside bark of the elm was applied to the tooth and gums.[31] A variation of this practice was that of the Alabama, who used the inside bark of the prickly ash for toothache instead of the elm. The Alabama also made a remedy from the boiled bark of the red oak as a wash for sores and as an internal medicine for assorted lung disorders. To treat the flux they boiled the inside bark of the pine.[32] The treatment of this latter complaint, a common disorder among all the tribes, shows how widely the Indians differed in their use of herbals. In addition to angelica, red sumac, wild plum, and pine, already mentioned in connection with flux, the Chickasaw used a decoction of cottonwood root and willow root boiled together as an internal remedy, while the Natchez Indians in Louisiana, in the early eighteenth century, relied on a bread made from ripe persimmons.[33]

The Indians in the Missouri River region used puffballs or prairie mushrooms as a styptic for wounds. For coughs, the fruits and leaves of the juniper were boiled together and the liquid taken internally. The bark from any species of oak—but the red oak in particular—was boiled to form a decoction to remedy bowel troubles. The smooth sumac, whose astringent qualities were widely recognized, was used by the Pawnee to make a remedy for dysmenorrhea and flux. The Omaha used this herbal as a styptic in cases of hemorrhage after parturition. Mallow was both an internal and an external remedy for the relief of pain, and was also applied as a salve for inflamed sores. Mint, another of the more commonly used herbals in the new world, was used as a carminative by all the tribes in the Missouri River region.[34]

In the Northeast, the Iroquois protected themselves from scurvy by making a tea from the bark and needles of the hemlock, a fact that Jacques Cartier happily discovered in 1536 when his men were being decimated by the disorder. Cartier also claimed that the tea brought relief in long-standing cases of venereal disease. Curiously enough, according to William Fenten, a modern authority on Iroquois herbals, the Iroquois herb doctors still use it as a basic ingredient in venereal medicines. Sassafras, a standard tonic and vulnerary among the Iroquois, was one of the Indian herbals to be hailed in Europe as a universal panacea. Maidenhair fern, another new world plant that temporarily gained fame in Europe, was used by the Mohawk and Seneca as a hemostatic in women's disorders. Ginseng, a herb common to many tribes, was used for diverse purposes. In general, it was an all-purpose tonic, but some Indians considered it a purgative for infants and a stomachic, and the Huron and Abenaki used it for dysentery.[35]

One of the most widely used herbs among the Indians of the Southeast was the yaupon or cassina, a member of the holly family. From the leaves and tender shoots of this plant, the Southern Indians made a decoction generally known as the "black drink." Repeated drinks of this beverage induced profuse sweating, one of the means by which the Indians achieved what they felt was spiritual purification. The caffeine in the yaupon produced stimulation, and a strong infusion undoubtedly had a narcotic effect. While this herb played an important role in Indian medicine,

it is questionable whether, in terms of the modern definition of medicine, it should be included among medical remedies. The black drink appears to have been taken only in connection with the tribal ceremonies, and its use was restricted to the warriors. It does not seem to have played any role in alleviating pain or healing the sick.

The vast number of species of herbs and their multifarious uses by the Indian tribes preclude any complete discussion of Indian botanicals. Suffice it to say that all the tribes were acquainted with herbal medicines, a number of which had an empirical value. In selecting their medical herbs, as has already been noted, the Indians relied on mystical signs rather than practical experience. Probably the most important factor in determining the use of a particular herb was the doctrine of signatures, the concept that a disease could be cured by a plant resembling either the symptoms or the part of the body affected. Thus a plant with a wormlike stem was given as a vermifuge, another with hairlike process was considered an antidote for baldness, and milkweed was used in cases of faulty lactation. The Cherokee, along with most other Indians, had considerable faith in any plant deviating from normal growth, a belief consonant with the doctrine of signatures. The bark from a tree that had survived lightning was considered an especially efficacious remedy, while a piece of wood from it was often placed next to a fractured limb. A piece of twisted wood was believed to be a cure for convulsions. While the doctrine of signatures was completely irrational, when it was applied often enough, the law of averages guaranteed an occasional successful remedy.

The symbolism of sacred numbers, characteristic of all culture groups, applied to the use of herbal remedies by the Indians. Among the Cherokee, the numbers four and seven possessed considerable mystical significance, and in compounding their botanical decoctions, they invariably used either four or seven plants. Unfortunately, in so doing, it was possible that the beneficial effects of one useful herb might be neutralized by the others. This Indian practice was not likely to have elicited any criticism from the European observers of the seventeenth and eighteenth centuries, who had considerable faith in their own polypharmacy.

Even in cases where the Indians used the correct herb for a particular sickness, as has already been mentioned, their method of administration often nullified any beneficial effects. In plants in which the useful chemicals are found in the leaves or blossoms, the Indians on occasion utilized the roots and the bark, or vice versa. On the matter of dosage, too, the Indians never realized that once the point of diminishing returns is reached in the administration of medicine, the results may very easily be harmful. Happily, the large quantities of water probably diluted the chemicals and thus saved the patient from any serious injury. On the other hand, the vomiting that often resulted from ingestion of quantities of liquid may well have nullified the effects of the medicine.

One last point deserves mention in connection with the Indian herbals. William Fenton, in his excellent study of Iroquois botanicals, demonstrated that the Indians added a considerable number of European plants to their materia medica during their years of contact with the Europeans. In addition to adopting a number of adventive plants, the Indians were quick to learn the remedies of the whites and to find from them new uses for their own herbs. Fenton shows that among the Iroquois this

process was already well advanced by the end of the eighteenth century.[36] This fact, taken in conjunction with the tendency of the Indians to turn increasingly toward the administration of medicines in their therapy after contact with the whites, raises some interesting questions as to the exact role played by herbals in the medicine of the aboriginal Indians.

Leaving the debatable point of Indian herbals and turning to the somewhat safer ground of Indian medical procedures, there can be little doubt that the most universal one was that of sucking blood from the patient. This practice, with some variants such as scarification, venesection, and cupping, was common to almost every tribe. Few commentators on Indian life from the earliest times to the present have failed to mention this aspect of medical treatment. Early evidence of the practice is to be found in the sketches made by an artist who accompanied a French expedition in 1564 to establish a colony in Florida. In one of them he depicted a medicine man sucking blood from the forehead of a patient.[37] An Englishman, Thomas Hariot, who accompanied Sir Walter Raleigh in one of his ill-fated attempts to gain a foothold in the new world in the 1580's, reported that when an epidemic disease struck the Indians shortly after the arrival of the whites, the medicine men attributed the sickness to invisible bullets. To prove their thesis they sucked from their patients strings of blood to which the bullets were supposedly attached.[38]

The first French to arrive in Louisiana in the early eighteenth century encountered similar practices among the Natchez and Choctaw. In 1719 Bérnard de la Harpe fell sick while traveling along the Red River. Fortunately, it was recounted, some of "the best jugglers . . . sucked his blood and relieved his sufferings. . . ."[39] At about the same time, another Frenchman in Louisiana, Le Page du Pratz, related that after enduring severe pains in the thighs for several weeks, he consulted one of the Natchez "jugglers." The medicine man made a series of small cuts in the vicinity of the pain, arranging the cuts so that he could suck all of them at once. The process was quite painful, du Pratz reported, but nonetheless gave him relief.[40] Many of the tribes followed a similar procedure but used a sucking horn to withdraw the blood. A common variant of the practice was for the medicine man, by sleight of hand, to pretend that he had sucked a small stone, piece of wood, a ball of hair, or some other foreign object from the body of the patient. The object was then shown to the patient to prove that the source of his difficulty was removed.

Regardless of what its therapeutic value may have been, the sucking of blood by medicine men was fully in accord with the Indian etiological concepts. By this method, the medicine man was in effect delivering the evil spirit or its agent from the patient's body. However, to Europeans of the colonial period, who accepted phlebotomy in all its forms as standard medical procedure, the Indian practice served as a convincing demonstration of the rationality of Indian medicine, and confirmed their faith in the efficacy of the Indian healing techniques.

Two medical practices customarily used in conjunction with phlebotomy were vomiting and the sweat baths. To the Indians, the cleansing of the body was a means of achieving spiritual purification, and emesis and sweat baths were an important aspect of their religious ceremonials. As with the administration of medicine, Indians frequently resorted to excessive vomiting. Among the Cherokee a

patient was often required to fast all day, and then force himself to vomit several times before sunset.[41] In the case of sweat baths, there was little danger to the patient, and doubtless the baths constituted one of the most admirable aspects of Indian medicine. In addition to their role in religious ceremonials and in the curing of sick persons, sweat baths were commonly used to refresh the exhausted warriors. Jean Bossu wrote of the Choctaw in 1768: "When they are tired and excessively fatigued, after returning from a war, or from a hunt, they use sweating in stoves as a restorative. (These stoves are round huts, built like ovens in the middle of the villages; they are kept in order by an Alexi or public doctor.) In these baths they boil all sorts of medicinal and odoriferous herbs, whose essences and salts rising with the steam of water, enter into the body of the afflicted person, and restores his lost forces." "This remedy," he added, "is equally good for abating and destroying all kinds of pains."[42]

In a discussion of the use of enemas among primitive peoples, Joan Lillico asserts that they were widely used by the Indians in North and South America. The Chippewa were credited with recognizing their nutritive value and with devising an instrument, from a deer's bladder, for giving enemas. The Apache poured a decoction into the anus through a hollow reed. Among the Dakota, Omaha, and Winnebago, a solution for rectal infusion was made from a mixture of water and the powdered bark and root of the Kentucky coffee tree (*Gymnocladus dioica*). The recurrent element of mysticism in Indian medicine appears in connection with the compounding of the infusion. The Indians carefully watched the reaction of the powder and water, believing that if the powder settled to the bottom, the patient would surely die. If the powder circled to the right and gradually mixed with the water, it was considered a favorable omen.[43, 44]

In connection with the subject of enemas, the Chipewyan in what is now Canada had evolved an interesting procedure. An eighteenth century traveler noted that when one of them became sick, the shaman and his assistants proceeded to build a conjuring hut into which the patient was placed. The conjurors, sometimes five or six of them, gathered around and began to suck and blow at the affected sections of the patient's body, meanwhile conversing with the spirits they had summoned. In certain afflictions, the treatment took a rather curious turn:

> For some inward complaints; such as griping in the intestines, difficulty of making water, &c., it is very common to see those jugglers blowing into the anus, or into the parts adjacent, till their eyes are almost starting out of their heads: and this operation is performed indifferently on all, without regard either to age or sex. . . . Being naturally not very delicate, they frequently continue their windy process so long, that I have more than once seen the doctor quit his patient with his face and breast in a very disagreeable condition.[45]

There are many references to the practice of sucking and blowing on the patients, but anal blowing as described here seems to have been unique.

One area in which Indian medicine had considerable success was in relieving the pains of rheumatism and neuralgia. Sweat baths, warm poultices, friction, and aromatic fumigations were all part of the external treatment, while various infusions were given internally to relieve the pain. Although there were variations to the treatment, at least some of these means were common to all the tribes.

In the field of wounds, contusions, and fractures, where the cause and result sequence was obvious, the Indians had a more rational approach than was true of the rest of their medicine. In general, Indian authorities agree that this phase of Indian medicine was handled fairly well, although here again, considerable differences exist as to the degree of knowledge and skill attained by the Indians. Eric Stone, the most outspoken champion of Indian medicine, credited them with as much if not more ability than the average European practitioner of the year 1800. They were familiar, he said, with the suture, tourniquet, cautery, and the art of bandaging with corn leaves.[46] On the other hand, some early observers and present-day anthropologists have taken a somewhat divergent view. The Cherokee, according to Mooney and Olbrechts, did very little to treat wounds, other than stopping hemorrhages and blowing some kind of herbal infusion over the cut or abrasion.[47] In his account of the Narvaez expedition in 1528, Cabeza de Vaca related that the Indians in Florida brought their sick for the Spaniards to heal. Not knowing what else to do, the Spaniards blessed the sick and hoped for the best. Fortunately, the Indians recovered, with the result that Spaniards acquired a reputation as healers. On one occasion, de Vaca used his knife to remove an arrowhead from the chest of an Indian and sutured the wound. When the Indian recovered, de Vaca was looked upon with awe.[48] If de Vaca's story is correct, it would indicate that medicine among the Florida tribes had not achieved a very high level.

The treatment of bullet or arrow wounds among the Choctaw in the eighteenth century consisted first of sucking blood from the wound and second of blowing the powder from various roots over it. Bossu claimed that one type of powdered root induced suppuration, and that another one dried and healed the wound. To prevent infection, the natives bathed the wound in a herbal decoction made from several roots. Although he did not specifically say so, Bossu implied that the natives did not cover the wound in any way.[49]

Lewis and Clark mentioned the sprinkling of powdered willow bark on wounds by the Plains Indians.[50] However, there is little evidence to substantiate the thesis that the Indians in general were familiar with sutures. They did recognize the need for permitting the wound to heal from the bottom, and among the Hopi and several other tribes, thin pieces of bark were used to keep the wound open. While it has been asserted that several tribes used sinew sutures, the question arises as to whether their use represented an aspect of cultural diffusion or of transfer. The Indians were quick to learn from the whites and readily adapted European techniques to native conditions. The use of sutures implies considerable skill, which certainly would have attracted the attention of the seventeenth and eighteenth century observers of Indian life. Their failure to mention the practice is a good indication that, while the technique may have existed among a few tribes, it was not generally known to the Indians.

Although opinions vary as to the effectiveness of Indian treatment of wounds, all evidence indicates that the Indians made rapid recoveries from even serious injuries, and that they were seemingly free from the infections that made wounds so deadly to contemporary Europeans. The custom of treating the wounded either in their own lodges or in special huts built at some distance from the village may well help

to explain this happy state of affairs. Adair noted, in the eighteenth century, that among the Creeks a separate shelter was built to keep each wounded warrior isolated for four moons. This isolation must not be construed in the modern sense, since visitors were permitted the wounded man. The majority of restrictions on the patient and visitors were sexual taboos that had little relationship to the prevention or cure of infection.[51] Nonetheless, under these circumstances, there was little danger of the fearful "hospital gangrene," which perennially swept through the hospital wards in Europe. Also, the Indian method of applying powders and infusions and of leaving the wound open probably promoted drainage and helped granulation.

The same elementary care given to wounds was applied to fractures and dislocations. All the Indian tribes tried to straighten fractured bones and to make some sort of splint. The skill of the Indians in this respect seems to have differed considerably from tribe to tribe. The Creeks and the Hopi were reputed to be well versed in treating broken bones. According to Curtis, a special group of Hopi medicine men specializing in the treatment of fractures and dislocations were able to achieve considerable success.[52] The Hopi were a relatively advanced culture group among the Indians; hence they may have developed some degree of specialization in medicine. Whether or not the Hopi had developed their bone doctors before the coming of the whites, this specialization was not found generally in the vast majority of Indian tribes, who contented themselves with setting the bone, making a crude splint, and hoping for the best.

Dislocations were given the same rough and ready but fairly effective care. Customarily the patient's friends or relatives held him and endeavored to pull the bone back into joint. An emergency technique for reducing dislocations was described by an eighteenth century observer:

> If an Indian has dislocated his foot or knee, when hunting alone, he creeps to the next tree, and tying one end of his strap to it, fastens the other to the dislocated limb, and lying on his back, continues to pull it till it is reduced.[53]

Probably the most important development in Indian medicine with respect to dislocations was recognition of the importance of muscular relaxation. In many tribes, just prior to replacement of the luxated bone, emetics were administered to the patient. This practice of using emesis to achieve muscular relaxation was followed by the Ottawa, Chippewa, and many of the tribes west of the Missouri.

In the field of surgery proper, the work of the Indian medicine men was very limited. With only a hazy idea about anatomy and having relatively crude instruments, it is not to be wondered that they accomplished little. By and large, their surgical practice was restricted to scarification and other forms of bleeding and the opening of boils. In general, the Indians had an abhorrence of amputations. Among the Cheyenne, as one authority stated: "No man was willing to lose arm or leg or finger, nor would any doctor take the responsibility of cutting off a limb."[54] A colonial writer declared of the Creeks that they were skillful in the use of splints, but that they never amputated.[55] The Natchez felt even more strongly about the subject than many other tribes. Dumont de Montigny, a French observer, wrote in 1758

that when one of their people broke an arm or leg, which could not be reset properly by the "alexis," "they make a feast to the one who is thus crippled, and after some days of amusement they strangle him."[56]

In discussing Indian surgery, Eric Stone stated flatly that they amputated digits. Unfortunately, Dr. Stone cited no evidence to prove his assertion, and this writer is inclined to question the statement. Fingers and toes were frequently cut off during the torture procedure, and many must have been lost in the course of hunting and wars, but that they were amputated as a therapeutic measure is an entirely different matter. There is no doubt that when a digit was lost, the Indians could at least provide a form of rude first aid. In the seventeenth century, one of the Jesuits, Father Joseph Poncet, was captured by the Mohawk, tortured, and finally adopted into one of their families. In the course of the preliminary torturing, one of his fingers had been cut off. Since his fate had not been decided, the wound was cauterized with a hot ember and wrapped in a corn leaf. Subsequently, when he was taken into the tribe, his new family applied a herbal poultice to the wound. About three weeks later, as a result of peace negotiations, Father Poncet was returned to the French. On his arrival in the white settlement, it was noted that his wound "was still far from healed" and the Jesuit was placed under the care of a surgeon.[57]

The only illustration of amputation given by Dr. Stone was that of a tribe in North Carolina. Assertedly they amputated part of the foot of their slaves in order to prevent them from escaping, and had evolved a fairly skillful technique involving the use of sinew sutures and the "skin flap." Dr. Stone conceded that this instance was an "interesting exception," and the fact remains that among Indians in general, amputations were not a part of the surgery.[58]

One last aspect of Indian surgery deserves mention. The art of trephining, which was practiced by certain of the Indians in South and Central America with a surprising degree of success, considering the crudity of surgical techniques, was carried into the southwest region of North America. However, evidences of its use among the Southwest tribes are scant, and it appears to have fallen into desuetude long before the coming of the whites. Although common to a number of early societies in various sections of the world, trephining had no practical implications for surgery among the Indians of North America. It is interesting, nonetheless, that so delicate and hazardous an operation should have been performed by several relatively primitive culture groups.

Happily, the Indians seem to have had relatively little difficulty in caring for pregnant and parturient women. Childbirth appears to have been a natural, easy process, largely because of the relatively small size of Indian infants. Post-partum complications, too, were reduced to a minimum. Among a number of the tribes the mother ordinarily received no assistance in the course of the delivery. Usually a special hut or shelter was built for her in which she was expected to remain in isolation until the birth process was completed. In other tribes, parturition took place in the family lodge with the assistance of one or more of the older women. Occasionally preliminary measures were taken in an attempt to ensure easy and successful childbirth. Thus the Cherokee gave decoctions of slippery elm to facilitate the expulsion of the child, while the Apache used maternity belts and sprinkled sacred

pollen on prospective mothers. In the case of the Apache, the maternity belt was a talisman or a charm, but among certain tribes, the maternity girdle or squaw belt had a more practical application. During parturition, the squaw belt was gradually tightened to exert a downward pressure on the abdomen of the expectant mother.

Almost all of the known postures were assumed during labor, the exact position depending on the particular tribe. Usually each tribe resorted to two or three standard postures. The Cherokee, for example, generally used one of three. In the first, the parturient woman was held reclining backward with her legs spread apart; in the second, she knelt on the ground; and in the third, she was seated in the lap of her husband.[59] In most of the tribes, a kneeling or squatting position was commonly used.

External manipulation was resorted to in difficult cases, some of it rather forceful. The most prevalent method was a downward pressure on the abdomen of the patient by means of the previously mentioned squaw belts or by one of the assistants, encircling the parturient woman with her arms. To correct the fetal position, the Cherokee used a rather drastic method. Four women picked up the parturient by her arms and legs and shook her until the baby was in the correct position for delivery. The Nez Percé used a somewhat similar procedure, and comparable methods were used by other tribes. Inducing vomiting, sneezing, or fright were techniques also utilized, as a means both of delivering the child and of expelling the placenta. In respect to the latter, the Indians applied pressure to the uterus during the third stage of parturition long before Credé's method of expelling the placenta was set forth.

Although external manipulation was common, internal maneuvers were rare, which in view of the Indians' lack of knowledge of asepsis and antisepsis was probably just as well. Recovery from parturition was usually rapid. In some culture groups, the woman was expected to assume her ordinary duties immediately; among others, a short time elapsed before the mother was ceremonially purified and permitted to resume her position in society. Customarily the taboos that had been applied to her when she became pregnant remained in effect for some time after parturition or at least until the purification ceremony.

The interchange between white and Indian medicine, which makes it so difficult to ascertain the original practices of the Indians, raises an interesting question in respect to abortion. A number of Indian observers have asserted that the Indians were familiar with herbs capable of inducing abortion. On the other hand, the amount of abortion among the tribes was directly related to contact with whites. In fact, among those furthest removed from contact with the whites, abortion does not seem to have existed.[60] Mooney and Olbrechts asserted that they found neither abortion nor contraception among the Cherokee, and that the Indians were horrified at the idea.[61] Yet studies of the tribes during the nineteenth and twentieth centuries reveals that the Indians used both drugs and mechanical means to bring about abortion. However, these abortions appear to have been designed largely to prevent the birth of half-breed children. Undoubtedly the Indians borrowed a part of their abortion methods from the whites. Granting that some Indians were acquainted with the practice earlier, it was certainly not general among them.

In glancing back over Indian medicine, one fact stands out clearly. The Indians were highly susceptible to the power of suggestion, and the medicine men, because of the inextricable mingling of religion and medicine, were in a position to capitalize on this fact. Early in the eighteenth century, a traveler wrote of the medicine men in North America:

> They, as well as we, have the Art of working on the Affections of their Hearers, by certain affected Preliminaries, with suitable Gestures and Postures, which though they appear ridiculous to us, are yet useful in preparing the Attention of the Auditors, and by that means have the wish'd for Effect on the Minds of those who wait for the Juggler's Decisions.[62]

Undoubtedly the mystic rites and the panoply of the medicine man, combined with the ceremonial drumming, chants, and dancing, must have profoundly affected the mind of the patient. When one adds to this picture the seeming faculty of the Indians to recuperate from injury and sickness, the success of Indian medicine men becomes more understandable. The Indians were familiar with many herbals, they could provide a measure of care for wounds and fractures, and they had developed a number of medical techniques. Granting all this, the statement that John R. Swanton made more than 30 years ago in regard to the medicine of the Creeks aptly sums up the situation: "The success of native remedies was due in part without doubt to the real medicinal virtues of the plants used, in part to the good effects of such a simple assistant as sweat bathing, and perhaps to a greater extent to the power of suggestion."[63]

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# Diseases and Medical Practice in Colonial America

*John B. Blake*

SMITHSONIAN INSTITUTION
WASHINGTON, D. C.

Three hundred and fifty years ago the first permanent English settlement on this continent was established at Jamestown, Virginia. Between 1607 and 1625, more than 7500 intrepid souls had landed on this inhospitable shore. Of these, scarcely 1000 were left. Some, discouraged by the difficulty of wresting a living from a wilderness, weary of hunger and the constant threat of unknown dangers lurking behind the forest wall, or disappointed in finding no gold, silver, or precious stones, had returned home to England. Others had fallen victim to Indian attack, particularly in the Great Massacre of 1622, when some 350 lost their lives. But the great majority had succumbed to disease.

In the early settlements, diseases caused by conditions of poor sanitation and summer heat took a heavy toll, and in addition, the colonists suffered severely because of lack of food. Describing the first summer in Jamestown, George Percy wrote:

> Our men were destroyed with cruell diseases as Swellings, Flixes, Burning fevers, and by Warres, and some departed suddenly, but for the most part they died of meere famine. There were never Englishmen left in a forreigne Countrey in such miserie as wee were in this new discovered Virginia. Wee watched every three nights lying on the bare cold ground, what weather soever came, warded all the next day, which brought our men to bee most feeble wretches, our food was but a small can of Barlie sod in water to five men a day, our drinke cold water taken out of the River, which was at a flood verie Salt, at a low tide full of slime and filth, which was the destruction of many of our men. Thus we lived for the space of five months in this miserable distresse, not having five able men to man our Bulwarkes upon any occasion. If it had not pleased God to have put a terrour in the Savages hearts, we had all perished by those wild and cruell Pagans, being in that weake estate as we were; our men night and day groaning in every corner of the Fort most pittifull to heare, if there were any conscience in men, it would make their harts to bleed to heare the pittifull murmurings & outcries of our sick men without reliefe every night and day for the space of sixe weekes, some departing out of the World, many times three or foure in a night, in the mornings their bodies trailed out of their Cabines like Dogges to be buried: in this sort did I see the mortalitie of divers of our people.[24]

In Virginia, the winter of 1609–1610 was known simply as the "starving time."

Similar disasters also beset other early colonists. In Plymouth, during the first winter,

> that which was most sadd and lamentable was, that in 2 or 3 moneths time halfe of their company dyed, espetialy in Jan: and February, being the depth of winter, and wanting houses and other comforts; being infected with the scurvie and other diseases, which this long voiage and their inacomodate condition had brought upon them; so as ther dyed some times 2 or 3 of a day, in the aforesaid time; that of 100 and odd persons, scarce 50 remained.[9]

With a few exceptions, actual starvation was a serious public health problem only in the early years of the first settlements. Most later colonists, profiting from the mistakes of the first, were better prepared for the rigors of pioneering a new land,

and when necessary, they could often obtain food supplies from the existing communities. Scurvy, and perhaps other dietary deficiency diseases, continued to play a role in the general health picture, although it is doubtful if all who were said to be affected with the "scorbutic taint" were actually suffering from this disease. On the other hand, in the absence of modern refrigeration and other methods of food preservation, the colonial diet must have lowered the vitality of many. Poor nutrition, ill-constructed and crowded houses, elementary notions of sanitation, and a life of exposure and toil left the colonists open to a host of afflictions.

The death rate was high: during most of the eighteenth century an average of more than 35 persons died annually in the town of Boston for every thousand living — more than three times the rate of today. Only a very high birth rate could keep up with the mortality and allow the country to grow. From a study of 22 genealogies (including 12,722 wives), it appears that married women during the colonial period had an average of about seven children each. Today the major killers are cardiovascular diseases and cancer. No doubt these were present in the colonial years as well, but it was epidemic and other infectious diseases that made the death toll so high.

One of the most common infectious diseases was malaria. As Oliver Wendell Holmes has shown, "fever and ague" existed in New England in the seventeenth century, and Cotton Mather in 1702 wrote of it as nothing uncommon. During much of the eighteenth century, it was especially common along the Connecticut shore and in the Housatonic River valley from New Milford north; one writer, in 1753, called "the intermitting fever, the common distemper of all new comers to Hoosatunnuk."[20] In the middle colonies — New York, New Jersey, and Pennsylvania — malaria was also a regular visitor. Even in New York City, one observer reported "Intermitting and Remitting Fevers to be very general after the autumnal equinox, when the season has been rainy,"[14] while the diary of Elizabeth Drinker, no less than the reports of medical authors, shows that in Philadelphia also malaria was an annual affliction.[16] Similarly, in Dover, Delaware, a new arrival in 1705 complained that "this is not only a seasoning in the Country, But Fever & Ague does every year seize the Inhabitants of the place."[17]

The disease was most prevalent in the Southern colonies, being "commonly there called the seasoning, which is an ague and fever seizing upon men in the heat of summer, chiefly upon new comers, therefore called by that name, but not sparing the more settled inhabitants, especially [this from a New England divine] in case of intemperate drinking."[20] References to ague in Virginia were relatively infrequent in the seventeenth century, but if New England suffered, Virginia could hardly have escaped completely. During the eighteenth century the disease undoubtedly prevailed widely. "The Seasoning here," wrote John Oldmixon in 1741, "as in other Parts of America, is a Fever or Ague, which the Change of the Climate and Diet generally throws new Comers into: The Bark is in Virginia a Sovereign Remedy to this Disease." Writing in the 1720's, Hugh Jones noted that fever and ague were "the Country Distemper, a severe Fit of which (called a Seasoning) most expect some time after their arrival," while a Scottish immigrant still suffering from this common affliction complained bitterly, "This place is only good for doctors and

ministers who have very good encouragem'nt here."[5-7, 13] Although malaria was already declining in New England by 1775, its vigor continued unabated elsewhere. After the Revolution, it moved west, with the settlement of the country, into Kentucky, Tennessee, and other states in the Ohio and Mississippi River valleys, where it gave Americans the gaunt look noted by Mrs. Trollope and other foreign travelers —which now survives chiefly in the cartoonists' characteristically lean-visaged Uncle Sam.

Another of the most common infectious diseases in the colonial era was dysentery, or "bloody flux," as it was then generally called. Readily spread by apparently healthy carriers, this malady, like malaria, was easily imported in the slow, crowded, and unsanitary sailing vessels of the seventeenth and eighteenth centuries. Thus the *Neptune* and the *Treasurer*, arriving in Virginia in 1618, "brought a most pestilent disease (called the Bloody flux) which infected the whole colony." Many tragic instances were recorded of vessels "over-thronged" with people, which suffered a loss of half or more of their passengers. For example, one arrived in Philadelphia in 1738 "in which out of 300, only 50 fares are left. They have mostly died from dysentery, skin sickness and inflammatory fever." Moreover, many of the survivors died after landing, "and thus diseases are brought into the country, so that many inhabitants and landlords become sick, are seized by the epidemic and quickly carried off."[12]

Dysentery, or perhaps another intestinal disorder, was also among the afflictions of the early settlers of Jamestown. At least one of them no doubt for the wrong reasons, believed that the water supply, "a well sixe or seven fathom deepe, fed by the brackish River owzing into it," was one of the principal sources "of many diseases and sicknesses which have happened to our people, who are indeede strangely afflicted with Fluxes."[6] This malady also frequently afflicted the New England settlements, where it occasioned a number of severe epidemics in addition to a heavy load of sickness and death. John Josselyn noted in 1675 that "griping of the belly (accompanied with Feaver and Ague) which turns to the bloudy flux" was a common disease there and had "carried away abundance of their children."[23] In Boston, epidemics were noted in 1657, 1669, 1671, 1676, 1684, 1700, and 1711. Similarly, in 1734, "After a Spring and Summer of extraordinary seasonable Weather, . . . as also a general measure of Health, it now, towards the close, begins to be very sickly, many both elder and younger Persons, being within a few Days taken down with a Fever and Flux, of which several have died after less than a Weeks Illness."[12] This epidemic is of particular interest because an account of it was scheduled to appear in the *Medical Memoirs* that a new medical society in Boston was planning to publish. Unfortunately no copy of the volume—if indeed it ever appeared—is known to exist.

Dysentery also took a heavy toll among the colonial armies, where it, rather than the typhus so prevalent among European soldiers, was the typical "camp distemper." This we may well believe from the charge that the colonial soldiers besieging Louisbourg in 1745 "as it were, poisoned themselves with their own Nastiness and eating their Food half dress'd." Moreover, the French "had during the Siege, so increased their *natural Nastiness;* that the whole Town was a meer *Jakes*, and their very *Wells*,

like so many *Common Shores*."[5] Writing in 1763, Governor Francis Bernard of Massachusetts noted that the losses sustained in this expedition had "affected the encrease of the people almost to the present times."

Similarly, the bloody flux wreaked havoc with Braddock's forces and no doubt contributed to his defeat in the Pennsylvania wilderness in 1755. Hundreds of American soldiers were laid low with this and other diseases during subsequent campaigns of the French and Indian War. All too frequently, convalescents or carriers brought the disease home with them, and throughout Massachusetts, this malady made the fall of 1756 especially deadly. It was prevalent also in the American forces encamped in Cambridge in 1775, as well as among the British troops who were being besieged in Boston. From there, the disease "extended itself more or less through the Country," so that Abigail Adams wrote from Braintree, "The desolation of war is not so distressing as the havoc made by the pestilence. Some poor parents are mourning the loss of three, four, and five children; and some families are wholly stripped of every member. . . . 'Tis a dreadful time with the whole province. Sickness and death are in almost every family."[12]

In the South also, dysentery was exceedingly common, and it wrought fearful havoc in towns and on plantations. For this reason, Walter Jones of Virginia, who obtained his M.D. at Edinburgh in 1769, gave it his especial attention. The subject of his thesis, he wrote in a letter home, "is the Bloody Flux, which is not a splendid one, but as it is amongst the worst Disorders with which our Country is often afflicted, I thought it my Duty to Study it particularly."[7] In Virginia and in other Southern colonies, as in the North, dysentery was one of the most prevalent and devastating of diseases.

Typhoid fever, so similar in its epidemiological characteristics to dysentery, must also have been a common malady in colonial America. For the earlier years especially, it is impossible to diagnose this disease with assurance, but it has been suggested that many of the "burning fevers" afflicting the Virginia settlers were typhoid, and that, in fact, it caused greater mortality than dysentery and malaria combined.[6] For the seventeenth century and much of the eighteenth, the evidence is sparse, but it seems highly probable, considering the prevalence of typhoid in Europe, contemporary sanitary conditions, and the frequency of carriers, that many of the cases of "long fever" and "nervous fever" reported in early records were actually this disease. As Nathan Smith wrote in 1824,

> We have reason to believe . . . from these imperfect and broken accounts, and from oral tradition, that it was not long after the first settlement of the country, before the inhabitants were afflicted with what is now called Typhus [typhoid], but which was then known by the various names of long fever, slow fever, nervous fever, putrid fever, &c.[23]

Typhoid was not fully and clearly differentiated from typhus until the work of W. W. Gerhard in Philadelphia in 1837, but during the previous century, symptomatic distinctions between the "slow, nervous fever" (typhoid) and "putrid, malignant, petechial fever" (typhus) were described by John Huxham in his *Essay on Fevers* (1739) and by others. There can, then, be little doubt of the presence of typhoid from Benjamin Rush's report that: "The slow Nervous Fever, as described

by Dr. Huxham, was a very common disease in Philadelphia, during my apprenticeship, (from the year 1760 to 1766) also for many years after, I settled in the city, which was in the year 1769." According to Thomas Cadwallader, Rush wrote, the fever "had gradually travelled here from Connecticut, where it was known by the name of the *Long Fever*."[14] Its later prevalence is clear from such works as Nathan Smith's brilliant *A Practical Essay on Typhous Fever*, first published in New York in 1824.

Influenza, too, as well as other respiratory diseases, appeared periodically. As John Winthrop recorded, it swept through the colonies from Canada to New York in 1647. Only 80 to 100 persons died in New England, he reported, but while this may have seemed a mild visitation in the seventeenth century, by modern standards this mortality in a population of some 25,000 indicates a rather severe epidemic. Influenza was again prevalent in New England in 1654–1655, and six years later, another "epidemical cold" seemed to affect nearly every family. In subsequent years similar epidemics reappeared again and again, like the "Malignant Colds and Coughs" prevailing in Boston in the late fall of 1700, "so epidemical that there [was] hardly a Family free from sore Inconvenience by them." During the eighteenth century similar epidemics were even more common, and reached every colony from Georgia to Maine. Typical was the experience of New England in the winter of 1717–1718, when, as Samuel Sewall wrote, "Lamentable Havock has been made amongst us, by a mortal Pleuretick Fever, whereby we are bereaved of many of our most valuable men." Occasionally, moreover, as in 1732, 1760, and 1772, the epidemics spread rapidly over most of the colonies.

Undoubtedly, many of the deaths during these outbreaks were caused by pneumonia or other complications. It is also clear, from the frequent references in the records to pleurisy, peripneumony, and assorted colds and coughs, that other respiratory affections were of common and often fatal occurrence in winter. As John Tennent wrote in *An Essay on the Pleurisy* (1742), this was "the most fatal Disease that affects the Constitution of the Inhabitants of this County."[11, 17]

Such diseases as malaria, dysentery, typhoid, and pneumonia, although appearing at times in epidemic proportions, might be found as endemics nearly every year. It is also probable that, at least in the larger seaboard towns, such contagions as diphtheria, scarlet fever, measles, and whooping cough were fairly frequent; certainly there is ample evidence of recurrent outbreaks of these diseases. No account of colonial epidemics could omit the exceptionally fearful visitation of "throat distemper"—chiefly diphtheria—that occurred in New England in the 1730's, which has been so ably described by Ernest Caulfield.[10] This outbreak first appeared in the small frontier town of Kingston, New Hampshire, in May, 1735. Opportunities for its spread were ample. Even the physicians believed that the malady "was communicated by means of a bad Air and not by Contagion," and their views hampered the efforts of Boston's selectmen to isolate an imported case. The Reverend Joseph Emerson warned his parishioners, "it is an inordinate and sinful Fear that you have of the Distemper, if it keep you from going *nigh* your Neighbours, to tend up them, to *watch* with them, or in any other *Respect* to be helpful to them." Another divine, as an example of courageous resignation in the face of death, cited the case of Su-

sannah Wilson: "After three or four Days Sickness, she gave away her Things to her Elder Sisters, & took the other children in her Arms and kiss'd them."

Soon after its appearance in Kingston, the epidemic spread to other nearby towns. It was prevalent in New Hampshire and northeastern Massachusetts in 1736, and by 1740 had affected most of the towns in New England. Causing fearful mortality among children, the disease killed in many cases three, four, five, or even more from a single family. It is said that in Haverhill, for example, more than half the children died, and 23 families were left childless. Boston also experienced an epidemic of "throat distemper" at this time, but was spared the frightful mortality suffered by the smaller, more isolated towns. Boston's physicians attributed this to their superior skill, but Dr. Caulfield has shown that, in fact, a relatively mild outbreak of scarlet fever occasioned Boston's distress, whereas diphtheria was the cause of the heavy mortality elsewhere. Boston's relative freedom from diphtheria at this time, Dr. Caulfield suggested, may be attributed to a much higher level of immunity resulting from previous endemic presence of the disease.

The belief that scarlet fever was only one form of the prevailing distemper led to much confusion among physicians at the time of this notorious outbreak and among historians since, but no comparable difficulties in diagnosis existed in the case of smallpox. This disease was probably recognized more clearly, and was certainly the subject of more intensive study, than any other in the colonial period. In Virginia, the first recorded epidemic occurred in 1667; it had been infrequent there during the seventeenth century, perhaps because so large a proportion of the population was composed of adult immigrants who had had the disease as children in England. In New England, however, where settlement was largely by families, including children, the disease took hold early. A notable epidemic in 1633, three years after the beginning of the great migration, made "terrible havock" among the Indians and killed among others Samuel Fuller, who had come in 1620 on the *Mayflower*. He had been the Pilgrims' "surgeon & physition, and had been a great help and comforte unto them; as in his facultie, so otherwise, being a deacon of the church, a man godly, and forward to doe good . . . ."[26] Massachusetts suffered again in 1648, and in 1666 a third epidemic occurred. The next outbreak of major importance came in 1677 and 1678, which occasioned the printing of the colonies' first medical publication, a broadside by Thomas Thacher entitled, *A Brief Rule to Guide the Common People of New England How to Order Themselves and Theirs in the Small-Pocks or Measels*.

In Boston the disease struck again in 1689, 1702, 1721, 1730, 1752, 1764, and 1775. Protected by their isolated position and stringent quarantine regulations in the eighteenth century, many New England country towns were spared these frequent outbreaks, but even the most remote did not escape completely, especially during time of war. In the middle colonies, which made little or no attempt to stem the spread of the disease, it occurred more often, affecting Philadelphia and New York nearly every five or six years after 1730. By the 1790's, in fact, it was never entirely absent from Philadelphia. Though never as prevalent as in Great Britain, the disease took a serious toll. One of the most devastating epidemics occurred in Boston in 1721, when 844 persons of a population of about 11,000 lost their lives. Although present in Boston in epidemic proportions only three times between 1711 and 1760,

smallpox caused, on the average, about 7.4 per cent of all deaths in that town during those years. No doubt typical was the reaction of Cotton Mather in 1702 when he learned that his daughter had caught the disease: "God prepare me, God prepare me," wrote the distraught father, "for what is coming upon me!" Spurred on by the recurrent outbreaks of this malignant disease, New Englanders in the eighteenth century built pesthouses and passed a series of increasingly stringent quarantine acts in an effort to ward it off.[3] As Benjamin Waterhouse pointed out,

> the malady has been kept at an awful distance, by restrictive laws, and still stronger popular impressions; so that in New England, the most democratical region on the face of the earth, the priest, the magistrate, and the people, have voluntarily submitted to more restrictions and abridgments of liberty, to secure themselves against the terrific scourge, than any absolute monarch could have enforced.[27]

Comparable only to smallpox in the public imagination was another epidemic of the colonial era, the dreaded yellow fever. The first definitely recognized outbreak in the new world ravaged English, French, and Spanish settlements in the West Indies in 1647 and 1648, prompting at that time the first quarantine legislation in British North America. It has been said that the disease attacked New York in 1668, and it is definitely known to have reached Boston in 1693. Brought there by a British fleet that had failed in an effort to reduce Martinique, the infection invaded the town, where several deaths occurred, "with very direful Symptoms, of turning *Yellow*, vomiting and bleeding every way and so Dying." Boston was not to suffer again until the 1790's, but in 1699 both Charleston and Philadelphia experienced the malady, and in 1702 it touched New York. A series of outbreaks affecting American seaports occurred in the 1740's, and again in 1762 there was an outbreak of yellow fever in Philadelphia. No doubt there were other epidemics as well, although many that have been attributed to yellow fever were unquestionably caused by some other disease. With its direful symptoms and its rapid and frequently fatal course, yellow fever aroused far more terror than other diseases of vastly greater importance, but it was in fact, at least north of Charleston, an infrequent malady compared to dysentery, malaria, or tuberculosis.[3]

To combat these diseases and the many other afflictions that beset the colonists, the medical profession—if one may call it that as it was in the seventeenth century—was woefully ill prepared. Physicians were scarce in the early years. The best educated members of the "faculty" in England—those who belonged to the Royal College, for example—rarely had cause to migrate, and it was instead the country practitioners who came. Most of them were no doubt apprentice-trained at home, and in the settlements of the new world, they generally had to supplement their incomes by farming or some other occupation. Some of these physicians were no doubt adequate by the standards of the time; others were no more than untutored herb-doctors or ignorant quacks. At the same time, many persons among the more educated classes in the colonies, who had acquired some knowledge of physic in the course of a university education, added medicine to their regular calling. One of the most noted practitioners of seventeenth century New England was Governor John Winthrop, Jr., of Connecticut, whose advice was sought by many. Ministers also frequently tended to their parishioners' bodily, as well as spiritual, ills, and

although Cotton Mather called this the "angelic conjunction," one may suspect that in most cases the patients' spiritual needs had first claim on the ministers' attention. Diseases were, after all, heaven's messengers, and there was comfort in the knowledge that "whom he loveth he chastiseth."

By and large, the treatments employed during most of the colonial period were traditional, being based on the Galenic theory of the four humors as it had come down through the Middle Ages. Except in cases requiring surgery, physicians relied primarily on bleeding, purging, and other methods of depletion. Occasionally one finds recommended such exotic remedies as bezoar stones and unicorns' horns, or some of the less savory preparations that abounded in contemporary English pharmacopeias. For example, in 1643, Edward Stafford of London sent to the elder Governor Winthrop an eight page manuscript of "Recipts to Cure Various Disorders,"[22] largely taken from the herbal of John Gerard, published in a revised edition in 1633. Among the suggestions were the following.

> My Black powder against the plague, small pox: purples, all sorts of feavers; Poyson; either by Way of prevention, or after Infection. In the Moneth of March take Toades, as many as you will, alive; putt them into an Earthen pott, so that it be halfe full; Cover it with a broad tyle or Iron plate; then overwhelme the pott, so that the bottome may be uppermost: putt charcoales round about it and over it, and in the open ayre, not in an house, sett it on fire and lett it burne out and extinguish of it selfe: When it is cold, take out the toades; and in an Iron-Morter pound them very well, and scarce them: then in a Crucible calcine them so againe: pound & scarce them againe. The first time, they will be browne powder, the next time black. Of this you may give a dragme in a Vehiculum (or drinke) Inwardly in any Infection taken; and let them sweat upon it in their bedds: but lett them not cover their heads; especially in the Small pox. For prevention, halfe a dragme will suffice: moderate the dose according to the strength of the partie; for I have sett downe the greatest that is needfull. There is no danger in it. Let them neither eate nor drinke during their sweat, except now and then a spoonefull of Warme posset-drinke to wash their mouthes. Keepe Warme and close, (for a child of 5 yeares, 10 graynes is enough in infection, for prevention 4 or 5 graynes.) till they be perfectly well; and eate but litle; and that according to rules of physicke.
>
> The same powder is used playster wise with Vineger for a gangrene, or bite of anie Venemous beast, taking it likewise Inwardly: it is used likewise for all Cankers, Fistulas & old Ulcers & kings Evill, strewing it upon the sore, and keeping them cleane.

Most of the medicaments proposed by Stafford were, however, of a simpler nature, his chief reliance being on such herbs as St. John's wort, black hellebore, cinquefoil, "the 4 great cold seeds" (of cucumber, gourd, watermelon, and melon), oak bark, maidenhair, parsley, fennel, rhubarb, witch hazel, elm, and elder, prepared in a variety of ways. Similarly, Governor John Winthrop, Jr., employed a number of simple herb drugs, but more often he preferred the use of minerals. Rarely, he gave iron, sulfur, or calomel. Nitre was apparently his favorite; he prescribed it in doses of 20 or 30 gr. for adults and 3 for infants. Another commonly used medicine was antimony, "(probably *diaphoretic*)," wrote Oliver Wendell Holmes, "a mild form of that very active metal, and which, mild as it was, left his patients very commonly with a pretty strong conviction that they had been taking *something* that did not exactly agree with them."[21]

For a synopsis of seventeenth century medical problems and therapeutics, one may

turn to *An Account of Two Voyages to Neu-England*, by John Josselyn, published in London in 1675.[23] He wrote:

> The Diseases that the *English* are afflicted with, are the same that they have in *England*, with some proper to *New-England*, griping of the belly (accompanied with Feaver and Ague) which turns to the bloudy-flux, a common disease in the Countrey, which together with the small pox hath carried away abundance of their children, for this the common medicines amongst the poorer sort are Pills of Cotton swallowed, or Sugar and Sallet-oyl boiled thick and made into Pills, Alloes pulverized and taken in the pap of an Apple. I helped many of them with a sweating medicine only.
>
> Also they are troubled with a disease in the mouth or throat which hath proved mortal to some in a very short time, Quinsies, and Imposthumations of the Almonds [tonsils], with great distempers of cold. Some of our *New-England* writers affirm that the *English* are never or very rarely heard to sneeze or cough, as ordinarily they do in England, which is not true. For a cough or stitch upon cold, Wormwood, Sage, Marygolds, and Crab-claws boiled in posset-drink and drunk off very warm, is a soveraign medicine.
>
> Pleurisies and Empyemas are frequent there, both cured after one and the same way; but the last is a desperate disease and kills many. For the Pleurisie I have given *Coriander*-seed prepared, *Cardiacs* seed, and *Harts-horn* pulverized with good success, the dose one dram in a cup of wine.
>
> The Stone terribly afflicts many, and the Gout, and Sciatica, for which take Onions roasted, peeled and stampt, then boil them with neats-feet oyl and Rhum to a plaister, and apply it to the hip.
>
> Head-aches are frequent, Palsies, Dropsies, Worms, Noli-me-tangeres, Cancers, pestilent Feavers. Scurvies, the body corrupted with Sea-diet, Beef and Pork tainted, Butter and Cheese corrupted, fish rotten, a long voyage, coming into the searching sharpness of a purer climate, causeth death and sickness amongst them.

During the 170 years of this country's existence as British colonies, substantial changes occurred in medical practice. In the larger towns at least, physicians became, during the eighteenth century, members of a self-conscious profession, and the necessity of combining medicine with another occupation declined. Thus William Douglass, who settled in Boston in 1718, found that he could "live handsomely by the incomes of my Practice, and save some small matter." At the time, Douglass was the only physician in Boston with an M.D. degree, but in subsequent years an increasing number of colonists were going abroad to London, Edinburgh, Leyden, and other European medical centers. They came back to become the leaders in the profession, and at the same time raised the level of preceptorship for those who could not undertake the expensive and tedious Atlantic crossing. As American seaports grew, it also became possible for physicians and others with scientific interests to meet together for discussion of their mutual interests. In 1735 Douglass was instrumental in founding a medical society in Boston, the country's first. When Dr. Alexander Hamilton of Annapolis, Maryland, visited the town in 1744, he attended meetings of this "Physicall Club" at the Sun Tavern, "where we drank punch, smoaked tobacco, and talked of sundry physicall matters."[19] This society did not survive, but some years later others were founded in New Jersey, in Litchfield County, Connecticut, and elsewhere, primarily in an effort to institute licensing and eliminate quacks.

That such measures seemed advisable to medical leaders is hardly surprising, when, as William Douglass complained, "A young man without any liberal education, by

living a year or two in any quality with a practitioner of any sort, apothecary, cancer doctor, cutter for the stone, bone-setters, tooth-drawer, &c. with the essential fundamental of ignorance and impudence, is esteemed to qualify himself for all the branches of the medical art . . . ."[18] Arriving at Huntington, Long Island, one evening, Dr. Hamilton had no sooner sat down for dinner in the local tavern than "a band of the town politicians in short jackets and trowsers" trooped in.

> Among the rest [wrote Hamilton] was a fellow with a worsted cap and great black fists. They stiled him doctor . . . . he had been a shoemaker in town and was a notable fellow att his trade, but happening two years agoe to cure an old woman of a pestilent mortal disease, he thereby acquired the character of a physitian, was applied to from all quarters, and finding the practise of physick a more profitable business than cobling, he laid aside his awls and leather, got himself some gallipots, and instead of cobling of soals, fell to cobling of human bodies.[19]

The shoemaker's success appears less surprising when one remembers that this was the century when Parliament paid a large sum for the disclosure of a "remedy" for the stone, while the Massachusetts General Court similarly rewarded a citizen of Worcester for making public a medicine that was not only able "to cure any Inflammation of the Blood, or to prevent or cure any breeding Sore whatsoever" in human beings, but was "also infallible to cure or prevent a Fistula or Pole Evil in Horses." More common than such achievements, however, were proprietary medicines of varying respectability, such as those long-time favorites, James's fever powder, Dover's powder, and Hooper's and Anderson's pills.[2]

Beneficial changes were becoming apparent by the beginning of the eighteenth century. One of the earliest examples was the colonies' first medical publication, Thomas Thacher's *A Brief Rule to Guide the Common People of New England How to Order Themselves and Theirs in the Small-Pocks or Measels*. Published in Boston in 1678, this broadside presented an excellent description of smallpox and a series of relatively simple and sensible rules for treating the disease. These were taken directly from Thomas Sydenham, and thus represented the best in medical advice at the time.[26] After 1700, the more repulsive concoctions of the seventeenth century were no longer used by educated physicians, though some of them hung on for years in pharmacopeias. Like Sydenham, William Douglass of Boston extolled the virtues of observation and experience as opposed to authority, and also like Sydenham, he believed firmly in the curative powers of nature. The besetting sin of most American practitioners, in Douglass' opinion, was that they did not give nature a chance.

> In our plantations [he wrote], a practitioner, bold, rash, impudent, a lyar, basely born and educated, has much the advantage of an honest, cautious, modest gentleman. In general, the physical practice in our colonies is so perniciously bad, that, excepting in surgery, and some very acute cases, it is better to let nature under a proper regimen take her course (naturae morborum curatrices) than to trust to the honesty and sagacity of the practitioner; our American practitioners are so rash and officious, the saying in the apocrypha, Ecclesiasticus xxxviii. 15. may with much propriety be applied to them. "He that sinneth before his maker, let him fall into the hands of the physician." Frequently there is more danger from the physician, than from the distemper; . . . but sometimes notwithstanding of male practice, nature gets the better of the doctor, and the patient recovers. . . .
>
> In the most trifling cases they use a routine of practice: when I first arrived in New-England,

> I asked G. P. a noted facetious practitioner, what was their general method of practice; he told me their practice was very uniform, bleeding, vomiting, blistering, purging, anodyne, &c., if the illness continued, there was repetendi, and finally murderandi, nature was never to be consulted, or allowed to have any concern in the affair.[15]

Douglass' statements may be taken with a grain of salt. He was, wrote Hamilton, "a man of good learning but mischievously given to criticism and the most compleat snarler ever I knew." Hamilton continued.

> He is of the clinical class of physicians and laughs att all theory and practise founded upon it, looking upon empyricism or bare experience as the only firm basis upon which practise ought to be founded. He has got here about him a set of disciples who greedily draw in his doctrines and, being but half learned themselves, have not wit enough to discover the foibles and mistakes of their preceptor. This man I esteem a notorious physicall heretick, capable to corrupt and vitiate the practise of the place by spreading his erroneous doctrines among his shallow bretheren.[16]

Most American physicians, however, did prefer a more active course of treatment than Douglass, prescribing in accord with humoral pathology a variety of emetics, cathartics, diuretics, diaphoretics, and other evacuants, such as powder of antimony, calomel, niter, and ipecacuanha, as well as Peruvian bark, liberal doses of opium, and frequent bleeding.

Many of these treatments, it is fair to assume, did more to weaken the patient than to help him. Most offered at best some palliative relief and allowed the healing processes of nature to assert their powers. There were, however, at least two important and definite procedures introduced into medicine during the colonial period that proved to be of specific value. These were the use of cinchona bark in the treatment of malaria and of variolation as a preventive of natural smallpox.

Who first introduced the use of cinchona bark, the most important active ingredient of which is quinine, into the treatment of intermittent fevers, and when, are still uncertain. Somehow its virtues became known to the Spaniards in Peru early in the seventeenth century, and it was brought by them to Europe, probably in the 1630's and probably in the normal course of trade—but, at all events, not, as tradition would have it, by the Countess of Chinchon. First mentioned in a medical book in 1643, it was for some years the subject of much violent controversy among physicians. Confusion between bark of the cinchona and that of the Peruvian balsam, which had been esteemed even earlier as a febrifuge, failure to distinguish malaria from other fevers, and the difficulty of adapting traditional Galenic theory to accord with the action of this specific hampered the acceptance of the new drug. Nevertheless, introduced into England about 1650, it was added to the London pharmacopeia as *Cortex peruanus* in 1677. During the last quarter of the century, it was well established, as much by empirics, who used it as the chief ingredient of secret remedies, as by more ethical members of the profession. Chief among the latter was Thomas Sydenham, who, at first skeptical, in time became a strong supporter of use of the drug.[18]

Cinchona was introduced into practice in the colonies after its acceptance in England. Although its high price limited its use at first, early in the eighteenth century Robert Beverley, writing of Virginia, noted that "of late the doctors there have

made use of the cortex Peruviana with success." In succeeding years, this bark quickly became one of the most common articles of medical practice, even being used as a tonic in fevers other than malaria. Although it did not conquer the disease, it afforded relief to innumerable colonists from one of their most common afflictions. "Betty Pratt is very well," wrote a Virginian in 1728, "about a week ago she had two fits of an ague & Fever, but she has taken the Bark, and is perfectly recovered." Cinchona was, according to another, "a perfect Catholicon" for fevers and agues, which "seldom fails of a Cure."[6, 7]

The second major improvement in medical practice during the colonial period, the introduction of variolation, or smallpox inoculation, came somewhat later. An ancient procedure in some regions of the Orient, it was first reported in western Europe by physicians who had learned of it in Constantinople and Greece. In 1714 and 1716, the Royal Society of London published accounts of variolation for the first time in the *Philosophical Transactions*. Finally, in April, 1721, Lady Mary Wortley Montagu introduced the practice in London. It soon attracted the attention of the Princess Caroline, and after a series of trials on criminals and others, two royal daughters were inoculated in April, 1722.

In America, meanwhile, the Reverend Cotton Mather of Boston, a devotee of science with omnivorous reading habits, learned about the practice from the articles in the *Philosophical Transactions*, and he decided to recommend it to the local physicians should the disease strike again. This he did when an epidemic broke out in 1721, and at his urging, Dr. Zabdiel Boylston first inoculated his 6 year old son Thomas and two Negroes on June 26. The public generally and most physicians reacted violently. In part, the objections were religious, some persons considering it a sin to interfere with God's purposes by bringing the disease upon oneself or by attempting thus to thwart His judgments. Many were using this opportunity to attack Increase and Cotton Mather for political reasons, while the personalities of the two chief antagonists, Cotton Mather and William Douglass, also contributed to the acrimony of the dispute. Among the public, however, the opposition arose primarily from a fear that the practice might spread the disease to those who would otherwise escape.

Backed by the Mathers and other leading clergy of the town, Boylston proceeded with his experiments. During the course of the epidemic, he inoculated 248 persons in and near Boston, while two other physicians treated another 39, bringing the total number of patients to 287; of these, 6 died. During the same period, 5759 citizens of Boston had natural smallpox, of whom 842 died. Clearly the death rate was much lower among those who had the disease by inoculation, and in subsequent years, further experience fully bore out this result. When smallpox appeared to be inevitable, as sooner or later it did to most inhabitants of the larger towns, it seemed preferable to have it by inoculation rather than naturally.[1]

Nevertheless, the practice was at first adopted slowly. After 1721, little was heard of it until 1730. In that year about 400 persons were inoculated during another epidemic in Boston, and the practice was also introduced in Philadelphia. From then until the Revolution, there were epidemics of smallpox in Philadelphia and also in New York City about every five or six years. Little was done to prevent

the disease, and among the wealthy, inoculation of children either at home or in special hospitals set up for the purpose became commonplace. Some physicians, indeed, became noted as specialists in this practice. For the poorer classes, on the other hand, who often found the surgeon's fee more than they could afford, Benjamin Franklin, a staunch supporter of inoculation, distributed a pamphlet by William Heberden explaining the technique.

In contrast to New York and Pennsylvania, the New England colonies, because of a not unjustified fear that variolation might spread natural smallpox, forbade the procedure by law and still more stringent custom, except during epidemics when all other control measures had proved of no avail. Thus, in Boston, inoculation was not used between 1730 and 1752, when during another epidemic 2124 persons were inoculated (with 30 deaths), there being 5545 natural cases (with 539 deaths). Impressed by these figures and similarly favorable results in other colonies as well as in England, the town's selectmen made arrangements to variolate the poor gratis when next the disease broke out, in 1764. At this time, there were 699 natural cases with 124 deaths, but 4977 inoculated cases with 46 deaths. Thus 88 per cent of the inhabitants who had smallpox—and very few escaped altogether—had it by intention. Thereafter, many of the more wealthy New Englanders, unwilling to wait for another epidemic before taking advantage of this protective measure, crossed the province line to New York, where several hospitals were set up to provide inoculation.

Inoculation could not prevent smallpox epidemics, but when they became inevitable, it could greatly mitigate their severity and substantially lower the death rate. Perhaps one of the best measures of its acceptance and success was its use during the Revolution. The soldiers who served under Richard Montgomery and Benedict Arnold in the campaign against Quebec in the winter of 1775–1776 came largely from the more isolated farming areas of the colonies, and most of them had never been exposed to smallpox. The disease broke out among them and contributed largely to the failure of the expedition. In subsequent years, however, most recruits to the American armies were inoculated at the time of induction, and throughout the rest of the War, smallpox, which otherwise might well have proved disastrous, was never a major problem. In this way the medical profession made its most important contribution to the winning of our national independence [8]

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## Cash Awards for Top Pupils

Members of a Congressional atomic energy subcommittee have proposed a $500 Federal award to all high school seniors who can pass a prescribed test in mathematics. The proposal was originally made in 1956 by President Eisenhower's Scientific Advisory Committee but was sidetracked by lack of support. The purpose is to interest more top flight students in mathematics and to improve courses of instruction in high schools. A slump in mathematics instruction has prevented many potential scientists in college from taking scientific courses in which mathematics is highly important.

# Medical Education and Medical Schools in Colonial America

*William Dosite Postell*

LIBRARIAN, LOUISIANA STATE UNIVERSITY SCHOOL OF MEDICINE
NEW ORLEANS, LA.

The immigrants who came to America were those who were dissatisfied with their lot in the old world. They came resigned to the privations and hardships they would face. It would not be an easy life and they did not expect it. They bore death and disease with the supreme confidence that their destiny was in the hands of their God, who would care for His children. To prepare for the future, for a life after death, was paramount. Schools were established, but advanced education was for the training of clergymen. Considering the status of medicine in Europe at that time and the attitude of colonials toward their life, there is little wonder that a century and a half was to lapse before a real effort was made to train physicians. But since the early settlers could not be too unrealistic regarding the state of their health, in time of sickness they turned to their leaders, the officers of government, and to their clergy for medical advice.

One of the first officials who ministered to the sick was Governor Edward Winslow of Plymouth who, according to popular belief, saved the life of Massasoit, chief of the local Indian tribe, thereby saving the colony from an Indian massacre. Governor John Winthrop, Sr., of Massachusetts took his responsibilities so seriously that he obtained a list of prescriptions from a physician in England to assist him in treating the ill. His son, John Winthrop, Jr., who is referred to as a physician and who served as governor of Connecticut for a long time, became famous throughout New England for his medical ability. He received letters from all sections of the country seeking his medical advice.[4] The clergy treated the sick also. As educated men, they were acquainted with the medical classics of that day and used what knowledge of medicine they had to prescribe for the ill. In view of these facts, it is not surprising that the first medical publication in the colonies to "guide" the people in how to treat themselves when afflicted with smallpox and measles was written by Thomas Thacher, minister to the Old South Church in Boston, who also acquired fame as a medical practitioner.[5]

Those responsible for the welfare of the colonists also attempted to attract trained practitioners. There were a number of physicians educated in the universities of Europe who came as immigrants or under contract for a period of time. A Dr. Walter Russell came to Virginia and is purported to have saved the life of Captain John Smith. Dr. Thomas Wotton is spoken of as the surgeon-general of the colony. Altogether, 15 physicians of prominence were listed among the early settlers of Virginia. The Massachusetts Bay Company in 1628 sent two medical men under contract to care for the colonists; a total of 30 odd physicians are said to have ministered to this colony during the first 150 years of its existence.[4] The Dutch East India Company, which first settled New York, made provisions for the health of the

colony by providing for a "comforter of the sick." Surgeons were known to have landed with the Dutch colonists. These men, trained at the famous medical school at Leyden, had a beneficial effect on medical practice in New York, since they set higher standards of practice that continued even after the transfer of New York to the English in 1664.[5] The Carolinas, with Charleston as the center, had, according to some historians, a larger proportion of European-trained practitioners than any other colony. But the urge to return home was strong among the university-trained physicians, and after staying a short time in the colonies, many returned to a safer and easier existence.

As life in the colonies became more stable, the demands on public officials and the clergy for medical advice came to an end. The generations who were born in the new world considered this their home. England was far away, and the colonists naturally began to provide for their own needs. Training, as understood at that time, was largely received by the apprenticeship method. Medicine shared in this outlook, and physicians were trained as apprentices. Of the 3500 practitioners in America at the beginning of the Revolution, only 400 held M.D. degrees, and most of these were from foreign universities. This was a heterogenous group as far as educational background was concerned. Anyone could practice medicine and almost everyone did. The European distinction between physicians and surgeons did not exist in America. Anyone professing himself a member of the healing art had to rise to any emergency. Physicians had to set bones and bind wounds, and surgeons had to treat fevers. The one exception to this in colonial America was the practice of obstetrics, which was still dominated by midwives. A young man who desired to become a physician apprenticed himself to a practitioner, who undertook to train him in the art of healing. During the colonial era the accepted tutelage period was seven years. Fees were charged as a rule and were usually a $100 a year, although in some instances they were higher. During his period of apprenticeship, the student followed whatever routine his preceptor demanded. In some cases he was probably treated as an indentured servant, in others as a member of the family. He had to look after the physician's horse and serve as janitor, as well as mix powders, make pills, bleed, cup, apply poultice, and do whatever else his master directed. Naturally, it followed that the quality of instruction varied greatly since there were no qualifications for those who served as preceptors. For this reason, the standards of medical education were in the hands of these physicians. A knowledge of Latin was sometimes required of the student before he completed his course of studies. Mathematics, natural history, and English grammar were part of the standard curriculum of all schools; so, no doubt they were required by many preceptors. However, considering the state of ignorance prevailing, many probably received an education similar to that of Dr. Elnathan Todd, as described by James Fenimore Cooper in his book, *The Pioneers*. Dr. Todd owed his career to his ability to swallow pills and to his "sickly" constitution. He was apprenticed to a physician, and for a couple of years he watered the physician's horse, "watered" various colored medicines, and carried about with him a Latin grammar and a book on midwifery. Because of a physician's absence, he was called on his first case and hence received the appellation of "doctor." After another year, he left for Boston to purchase medicine

and to walk the hospitals. He returned in two weeks, and from then on acquired his knowledge of his profession by practicing on his patients. With all its faults, the preceptorial system was not likely to be overconcerned with the various systems and theories that plagued medicine during the eighteenth century. The student physician was dealing with actual clinical cases that came under his observation. He handled them according to frontier methods. He might not understand or appreciate what he observed and did, but he did develop self-reliance and self-confidence, which have characterized American medicine from its beginning. On the other hand, this method fostered direct action without knowledge, which all too often proved disastrous to the patient.

When society provides no safeguards or standards to protect itself, charlatans are going to prey on the cupidity of the unfortunate. Quacks abounded, promising cures for any and all ailments. Because of the mystery surrounding the Indian and his manner of living close to nature, his medicinal ability was rated high, and those claiming a knowledge of Indian lore were popular. It was a period in which it was difficult to determine who was a quack and who was not. So empirical in their methods were some of the reputable physicians that they could easily be classed as charlatans. And so low were the standards of medical practice that many historians refer to it as the era of "kitchen physick."

When the fight for existence began to ease somewhat, the colonists began to show an interest in the age-old social questions that have concerned man in all organized societies. One of the important questions to engage their attention was who could practice medicine. Aware of the abuses existing, the public first sought medical legislation to remedy the situation. Such laws were slow in being enacted by the different colonies and, when they were passed, usually dealt with fees, quarantine, and inoculation. It was not until the end of the colonial period that some attempt was made to establish regulations by requiring licenses for those wishing to practice medicine. New York, in 1760, was the first state to enact such a law. A board of examiners, composed of the members of His Majesty's Council and whomever they asked to assist them, were to examine all applicants and certify to their fitness to practice the healing art. A similar law was enacted by the New Jersey Assembly in 1772. These were the only two colonies to pass laws designed to set standards for practicing physicians. Another step instrumental in raising standards of the medical profession was the organization of state societies, which eventually became the licensing agents for the state. The enactment of medical legislation and the organization of societies, combined with the influence of those physicians who had received a formal medical education abroad, set the stage for the establishment of schools to train those who wished to practice medicine.

The first step taken in the formal education of physicians in this country was a system of lectures and demonstrations to a group of students. This type of instruction was the result of the promotional effort of an individual who had received his medical education at one of the European universities and, on returning to his native country, saw the need for some formal training. The first plan on record for a "public physical lecture" was made by Cadwallader Colden, an Edinburgh graduate, who proposed such instruction in Philadelphia. The plan involved paying Colden to

attend the poor of the city and the establishment of a course of lectures to be paid for by a tax levy on every man older than 21. Nothing came of this plan.

Thomas Cadwalader, another practitioner, who had studied under William Chesselden, in 1730 or 1731 gave practical demonstrations in anatomy. Cadwalader performed a post-mortem examination in 1742, which is credited as being the first scientific autopsy performed in this country.[7] Other physicians are known to have conducted such courses. Dr. John Bard of New York was the first private teacher of medicine in the city. William Hunter, a relative of the two famous brothers, John and William Hunter, had settled in Rhode Island, and between the years 1754 and 1756 gave a systematic course of lectures on anatomy. The students were charged a fee for each lecture, and at the conclusion of the course were given a certificate. Before the establishment of medical schools, these certificates were all that many practitioners could show attesting to their qualifications for practicing medicine.[7]

The first medical degree given in this country was an honorary degree conferred by legislative act of the Assembly of Rhode Island and Providence Plantations in 1663–1664 on one John Cranston for his ability in comforting those who sought his skill in "phissicke and chirurgery."[7] Sixty years after the granting of this degree, the first medical degree conferred by an educational institution in what is now the United States was awarded. It was an honorary degree given by Yale College to Daniel Turner, a practitioner of London. Turner, because of his wish to break with the barber-surgeons and be admitted as a fellow to the Royal College of Physicians, sought a degree from some school. What transpired we do not know, but it is known that shortly after Yale became the recipient of a gift of books from Turner, he received the coveted degree.[7]

The first medical school was established at the College of Philadelphia as the Medical Department of the College. The date of its founding was 1765. The two men responsible for its founding were William Shippen, Jr. (1736–1808), and John Morgan (1735–1789), both of Philadelphia. William Shippen, after obtaining the best education available in the colonies, studied medicine under his father for three years, after which he went abroad and studied medicine under such famous men as John and William Hunter. He obtained his medical degree from Edinburgh, and in the year he returned (1762) began a series of lectures on obstetrics, the first course of this type to be given in America. The announcement of his course of lectures stated that beds had been provided for poor women in the Pennsylvania Hospital, thereby making clinical material available. In his lecture notes, Shippen said he was resolved on giving this course of lectures because of the poor quality of obstetrics practiced by unskilled old women, with the resultant suffering.

The credit for founding the school is accorded to John Morgan. He graduated from the College of Philadelphia in 1757 and studied medicine under John Redman, a noted Philadelphia practitioner of that day. After some experience as a military surgeon, he resigned from the army and went to Europe to further his studies. He studied under some of the most celebrated physicians of Europe and, like Shippen, obtained his medical degree from Edinburgh, returning to this country in 1765. He distinguished himself in several ways and was admitted to many of the outstanding medical societies in Europe. During his period of study, he was formulating

plans for the establishment of a medical school in his native city. Undoubtedly he had discussed his plans with many eminent physicians as well as with William Shippen while both were in Europe. When he returned to this country, he brought with him letters from prominent members of the medical profession and from former members of the Board of Trustees of the College of Philadelphia urging the appointment of professorships for the study of medicine and surgery. Dr. Morgan's project met with the immediate approval of the Board, and in 1765 the school was established with the appointment of Morgan as Professor of the Theory and Practice of Physick.

On May 30 and 31 of that year Dr. Morgan delivered a lecture, "Discourse upon the Institution of Medical Schools in America." He had written this while in Paris and had it scrutinized by such famous men as Drs. Fothergill, Hunter, and Watson. In this address he pointed out the importance of a comprehensive general education preparatory to the study of medicine, the place of the hospital in the teaching program, and the eminent physicians in the city capable of receiving appointments to the faculty, and concluded by prophesying that this school would, by its influence, serve as an inducement for the establishment of other schools and would encourage the organization of learned societies for the spread of knowledge. This address has become justly famous for its program of medical education, which was so far-seeing and broad in scope that only now are many of its prophecies being fulfilled in the development of American medicine.[6]

In September of that year Dr. William Shippen, Jr., applied for and was elected Professor of Anatomy and Surgery. In his letter of application for the position, he stated how long he had been interested in the establishment of such a school and had only waited to be joined by his friend John Morgan before proceeding with plans for the founding of the school. The first session of the new school opened on Monday, Nov. 18, 1765. Dr. Morgan lectured on materia medica, pharmaceutical chemistry, and, whenever time permitted, practical observations on diseases, diet, and medicine. This course, conducted three days a week, continued for three or four months and was intended to be the introductory course to the second year, which was to cover the theory and practice of physic. The first class was graduated June 21, 1768, the first graduating class from a medical school in America. Ten students were in this class and the degree conferred was the M.B., the first medical degree given in this country; this followed the English custom of granting the M.B. first and the M.D. after a period of years on the basis of an examination or a thesis. The rules of the College of Philadelphia stated that after three years, the M.D. degree could be conferred. Four of the 10 graduates were admitted to the doctorate in 1771.

During the first two years Drs. Morgan and Shippen composed the entire faculty, but their lectures were supplemented by the clinical lectures of Dr. Thomas Bond in the Pennsylvania Hospital. In 1768 and 1769 the faculty was supplemented by the addition of Dr. Adam Kuhn (materia medica and botany) and Dr. Benjamin Rush (chemistry). The young school grew rapidly and was well attended. The need for funds was great, however, and in 1772, Morgan, at his own expense, went to the British West Indies in an effort to raise money among the rich colonists there. He was successful in raising 2000 pounds. The session of 1769–1770 was notable for

the youth of the faculty. Dr. Bond (clinical medicine) was the oldest, 50 years of age; Dr. Morgan (theory and practice of medicine), 34; Dr. Shippen (anatomy, surgery, and midwifery), 33; Dr. Kuhn (materia medica and botany), 28; and Dr. Rush (chemistry), 24. It was due to the zeal, enthusiasm, and ability of these young men that the infant school was able to survive the turbulent years of its beginning. Up until 1774 a total of 34 medical degrees had been conferred: 29 M.B. and 5 M.D.[10] From this tiny beginning, the school continued to grow. Outstanding men have served on its faculty, and through the years, the school's prestige has placed it among the first schools in America.

New York followed shortly after Pennsylvania in establishing a school of medicine. A school was inaugurated in 1767 at King's College, now Columbia University. The faculty consisted of the best men in the medical profession in New York City. Dr. Samuel Clossy (anatomy) was a graduate of Trinity College, Dublin; Dr. John Jones (surgery) had studied in Europe under the best practitioners of that day; Dr. Peter Middleton (physiology and pathology) had studied at St. Andrew's University before emigrating to New York; Dr. James Smith (chemistry) was a Leyden graduate; Dr. John V. B. Tennent (midwifery), an Edinburgh graduate and a member of the Royal Society; and Dr. Samuel Bard (theory and practice), also an Edinburgh graduate and no doubt the best known to posterity. Prior to the opening of the school on Nov. 2, 1767, notices appeared in the local papers outlining its plan and purpose. Admittance requirements stipulated a degree in arts or a "compleat knowledge" of Latin and of the various branches of natural philosophy. Both the bachelor's and doctor's degrees were to be awarded. The bachelor's degree was to be conferred three years from the date of entry to the College and after attendance at a complete course of lectures under each professor. A student with two years' service under a preceptor would be required to matriculate only two years. Candidates for the doctor's degree had to have obtained the bachelor's degree, attended two courses of lectures under each professor, reached the age of 22, published and publicly defended a thesis. Opening ceremonies were dignified with the appearance of government officials, trustees, and honored guests. The inaugural oration was given by Dr. Middleton on the "Antiquity, Progress and Usefulness of that Science." A comparison of the curriculum of this school with its sister institute in Philadelphia confirms the impression that the courses of study were similar. Both schools were patterned after European schools, particularly Edinburgh, from which so many of the faculty had graduated. Two graduates in 1769 received the B.M. degree. In 1770 and 1771 these two candidates received their doctorate. King's College was the first school to award the M.D. degree in America. In 1774, 18 medical degrees had been conferred by the school: 12 M.B., 2 M.D. in course, and 4 M.D. ad eundum. The M.D. in course was the degree conferred after the awarding of the M.B. and was based on an examination or the presentation of a thesis. The ad eundum degree was granted to one who already held the same degree from another institution.[10] The school was discontinued during the War, but at the War's end was reorganized under the name of Columbia College.

At the beginning of the Revolution, medical education had taken roots, so to speak. A start had been made. The medical profession was aware of the need for

the establishment of schools and raising of standards. In keeping with the advance of American culture, medical education has progressed, until today, as a result of this small beginning by men of vision, schools that are fulfilling the prophecy made by Dr. John Morgan, have been established throughout the country.

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## Poison Control Centers Increasing

The U. S. Public Health Service has set up a national clearing house to correlate and speed up collection of data on antidote and first aid treatment of accidental poisoning caused by drugs, insecticides, and various chemicals commonly found in the household. The network of poison control centers in this country has increased from two in 1953 to 101 (in 36 states) in 1957. The aim of the central clearing house is to gather and correlate information relating to ingredients that may cause poisoning, and prevent dangerous delays in getting antidote and treatment recommendations to the physician who needs help. The clearing house program will be directed by Dr. Howard M. Cann, Special Health Services, U. S. P. H. S., Washington, D. C.

TREATMENT FOR URETERAL STENOSIS. Four patients with ureteral stenosis after urinary tuberculosis or lithiasis were treated by ileocystoureteroplasty (Presse méd. 65:1884, 1957). Excellent results were reported in all 4, including a severely ill child with a single tuberculous kidney, in whom intrapelvic chemotherapy by retrograde injection led to sufficient improvement to permit ileocystoplasty, with cure.

VIRAL INTERFERENCE. A newly discovered agent with "exciting clinical potential" for viral interference was reported recently by Alick Isaacs (National Institute for Medical Research, London). In in vitro experiments, Dr. Isaacs mixed inactive virus particles with chorioallantoic membrane of chick egg. After washing and incubation with live virus, the mixture yielded a substance serologically distinct from the virus that interrupted the cell's metabolic activity. Dr. Isaacs termed the substance "interferon" and suggested that it acts by damaging ribonucleic acid within the virus.

DRUG EFFECTIVE AS LAXATIVE IN PREGNANCY. A standardized senna preparation (Senokot, Purdue Frederick) fulfilled the primary requirements of a laxative in obstetrical practice--uniform effectiveness without side reactions (Quart. J. Surg., Obst. & Gynec. 15:30-34, 1958). In a clinical trial conducted on 59 antepartum and 10 postpartum patients, excellent results were obtained in 97 per cent of the gravid patients and all of the puerperal patients. Administration of the drug did not result in side effects if overdose was avoided, and patient acceptance was complete in this series.

BILL SETS TESTS FOR DRUNKENNESS. A House and Senate committee has agreed on a bill that will set methods and standards to be used in interpreting chemical tests as evidence of drunkenness in the District of Columbia. The bill states that 0.2 of 1 per cent or more of alcohol in the urine or 0.15 of 1 per cent in the blood, by the method specified, shall be considered prima facie evidence of drunkenness. The bill includes permission to use breath tests as evidence, and protects the right of persons who object to having any chemical tests made. The tests will be used to detect drunkenness in negligent homicide, manslaughter, and drunken driving cases.

DRUG ELIMINATES HEAD LICE IN SINGLE SHAMPOO. Kwell shampoo (Reed & Carnrick), a new remedy for pediculosis capitis, one of the largest factors in school absenteeism, gave excellent results in a single shampoo, eliminating all lice and eggs from the hair of 83 per cent of 47 children (J. Pediat. 52: 448, 1958). One or two additional washings sufficed to clear up the other 8 cases. The shampoo was praised for its "one-shot effectiveness," its "patient acceptance," and its safety and simplicity. Previous remedies have involved application of drugs for 24 hours with a towel wrapped around the head.

VA TO STUDY NEW TUBERCULOSIS DRUG. A new synthetic drug, thiocarbanidin, will be tested against tuberculosis by the Veterans Administration. Use of the drug in human beings and animals indicates it has no ill effects and may be helpful to patients for whom treatment with other TB drugs is not satisfactory. It is hoped the new compound may prove to be an acceptable substitute for PAS, which causes nausea and vomiting in some patients. Thiocarbanidin is given by mouth in small doses, and its therapeutic effect is reported to be similar to that of PAS.

PLAGUE FIGURE DROP IN 1957. Only 514 cases of plague were reported throughout the world in 1957, as compared with 670 in 1956 and 1228 in 1955 (WHO Weekly Epidemiological Record, no. 4, 1958). The 1957 figure, the lowest for any year since the beginning of the century, is accounted for by the unusually small number of cases in India (44). In 1957, Burma reported 198 cases; Ecuador, 72; Madagascar, 57; the Belgian Congo, 35; and Peru, 31.

CHEMICAL ABNORMALITY IN SCHIZOPHRENIA. The existence of a chemical abnormality in the central nervous system of schizophrenic persons was reported recently at the Boston Society of Psychiatry and Neurology. The cerebrospinal fluid of schizophrenics was found to contain lower quantities of neuraminic acid than are normally present in non-schizophrenic adults. However, it was warned, the evidence does not yet permit any conclusions concerning the etiological significance of these findings.

U. S. PUBLIC HEALTH SERVICE NEEDS PHYSICIANS. The U. S. Public Health Service has recently started a drive to recruit more physicians as commissioned officers for immediate active duty. Physicians subject to draft call are permitted to fulfill their military obligations by serving as commissioned officers in the U. S. P. H. S.

# Malignant Thymoma

## Presentation of a Case

*Frederick P. Loprete, M.D.,* Joseph I. Echikson, M.D.,† and Edwin H. Albano, M.D.‡*

MARTLAND MEDICAL CENTER

NEWARK, N. J.

In 1916, Ewing stated that tumors of the thymus gland had consistently resisted all successful attempts at proper interpretation and classification. However, since that time our knowledge of the anatomy of the thymus gland has advanced because of the painstaking work and contributions of Hammar. Erroneous ideas about the internal secretion of the thymus have been corrected by the experiments of Pack and McClure, and the clinical manifestations and pathological findings in a large number of patients with thymic tumors have been analyzed and recorded.[1-3]

The thymus is an epithelial and lymphoid structure prominent during childhood. Its relative size is greatest at time of birth, when it weighs about 13 Gm., and its absolute size is greatest at the time of puberty, when the average weight is about 30 Gm. In adult life, it undergoes atrophy and replacement by fatty tissue. In addition to the physiological atrophy, which occurs after puberty, an atrophy may also occur in the course of serious illness or infections of childhood. Hyperplasia of the thymus occurs in hyperthyroidism, acromegaly, some cases of Addison's disease, and in eunuchics. In infants and young children, an enlarged thymus may occasionally cause respiratory compression and produce symptoms of dyspnea, cyanosis, and stridor.[3]

As the histogenesis of the thymus gland has been established by Hammar, thymomas can be divided into two groups, namely: those originating from lymphoid tissue (lymphosarcoma) and those derived from the epithelial reticulum of the thymus (carcinoma). Tumors of the thymus are rare. About one half of the cases of myasthenia gravis are associated with a benign tumor of the thymus (thymoma). Myasthenia gravis is a condition of weakness or abnormal fatigability of muscles. It is believed to be due to some interference with the transmission of impulses across the myoneural junction, a condition temporarily overcome by the administration of neostigmine and simulated by curare poisoning. Lymphocytic infiltrations are found in the affected muscles. The nature of the association of the myasthenia gravis with the thymus is uncertain. In many, but not all, cases of myasthenia gravis in which thymic tumor is absent, a thymic hyperplasia of lymphocytic cells has been found without a generalized lymphoid hyperplasia.

The diagnosis of thymoma can usually present much difficulty because of its location, slow growth, and lack of any organized signs and symptoms. Jones[4] and Janeway[5] described the most frequent clinical symptoms of thymoma. Enlargement of the thymus, by virtue of its location, may produce compression of the mediastinal

* Senior Medical Resident, Martland Medical Center.

† Chief, "A" Medical Division, Martland Medical Center.

‡ Chief Pathologist, Director of Laboratories, Martland Medical Center.

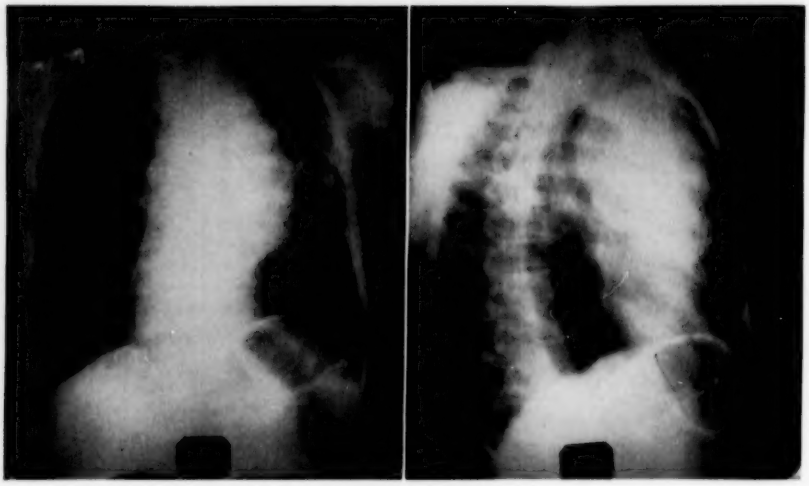

FIG. 1. Left, Posteroanterior view, Feb. 8, 1957. Right, Left oblique view, Feb. 14, 1957. Reveals large convex shadow in the region of the aortic arch extending downward to the left ventricle. Suggestive of a mass, possible aortic aneurysm.

structures, resulting in cough, hoarseness, cyanosis, engorgement of neck veins, and edema of the face and upper extremities. The most common complications are obstruction of the trachea and esophagus and pulmonary invasion. Frequently, symptoms are lacking and the presence of enlarged thymus may be suspected only after a routine chest roentgenogram.

An adequate history and the finding of a widened mediastinum are prerequisites to a diagnosis of thymoma. However, the chest roentgenogram is of utmost diagnostic importance. Any round, sharply defined mass situated behind the sternum and above the pericardial sac, found on a chest roentgenogram, is suggestive of a thymoma. Good has related that in some cases of myasthenia gravis, the anteroposterior chest roentgenogram failed to reveal a thymoma, though it could be visualized on a subsequent lateral view.[6,7] The tumor may be found not only in its usual location, retrosternally, but also at the level of the ninth or tenth thoracic vertebra, above the diaphragm, in front of the pericardium, or on the anterior surface of the left main-stem bronchus, as reported by Castleman and Norris.[8]

Any tumor of the thymus, benign or malignant, is called a thymoma. The thymus may undergo carcinomatous or sarcomatous changes and may invade the surrounding organs or produce distant metastases. The malignant tumor invades the lungs, pleura, mediastinal lymph nodes, heart, pericardium, trachea, vena cava, and liver, in that order of frequency.[10,11]

The following case exemplifies the difficulty in making the diagnosis of thymoma.

CASE REPORT

A 52 year old white man was admitted to the Martland Medical Center Feb. 2, 1957, with the chief com-

plaints of chest pain and slight shortness of breath and weight loss—all beginning three weeks prior to admission. The patient stated that the pain bore to his back, was fluctuant in severity, and caused him to have many sleepless nights. He noticed a cough and shortness of breath on exertion. His pain was worse when he lay on his left side. Also, he complained of weakness and stated that he had lost approximately 25 pounds in one month. He denied having night sweats, hemoptysis, or dysphagia.

Past history revealed that the patient had been admitted to a county sanatorium on July 22, 1953, with a diagnosis of active pulmonary tuberculosis. The chest roentgenogram revealed a scattered, patchy, nodular infiltration throughout both lung fields. Sputum studies on admission were reported negative, but subsequent studies revealed positive findings of tuberculosis. In July, 1954, after chemotherapy, the sputum became negative and remained so. Serial roentgenograms revealed progressive clearing of the bilateral infiltration. The patient left the sanatorium on Aug. 12, 1954, against medical advice. The diagnosis on discharge was far-advanced bilateral tuberculosis. The sputum was negative and the pulmonary condition was considered active and improved.

Physical examination revealed a fairly well-developed, poorly nourished white man, 52 years old, appearing tired but not in acute distress. He displayed no signs of cyanosis or peripheral edema. Temperature was 98.6 F.; pulse, 120/minute; respirations, 24/minute; blood pressure, 115/75 mm. of mercury. The pertinent positive physical findings were limited to the chest and the eyes. The chest was clear to percussion. Dry wheezing was elicited over both lung fields, and the mediastinum was considered slightly enlarged to percussion. Both pupils were pin-point and fixed.

*Laboratory Examination.* Chest roentgenogram revealed a homogeneous mass in the ascending aortic region and scattered areas of healed tuberculosis in both apical regions. There was slight widening of the mediastinum.

Urinalysis was normal: hemoglobin, 13 Gm.; hematocrit, 42 per cent; total white cell count, 6400/cu.mm, with a normal differential. Sedimentation rate was 52 mm./hr.; fasting blood sugar, 89 mg./100 ml.; blood urea nitrogen, 9 mg./100 ml. Serology was negative. Alkaline phosphatase was 5.8 units; acid phosphatase, 0.8 unit. Serum calcium was 10.3 mg./100 ml.; Bromsulphalein retention, 6.7 per cent; serum bilirubin,

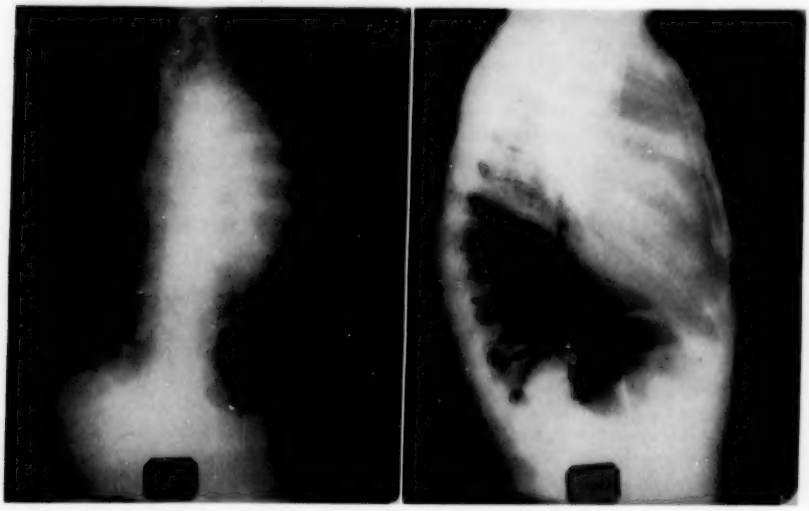

FIG. 2. Left, Posteroanterior view, March 28, 1957. Right, Left lateral view. Re-examination of the chest demonstrates once again findings strongly suggestive of aortic aneurysm. However, rapid increase in the size of the mass indicates that the mass represents a neoplasm. The mass has increased laterally and in height. The trachea is pushed markedly to the right. The right lateral margin of the mass is more prominent.

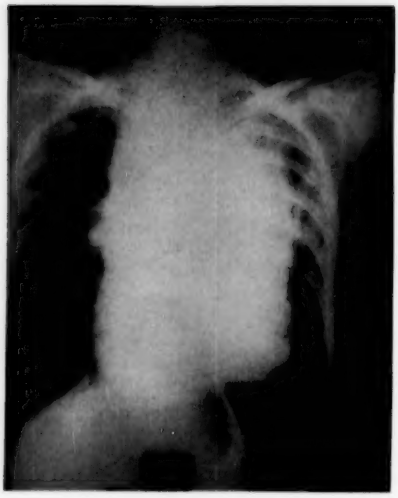

FIG. 3. Posteroanterior view, April 30, 1957. Re-examination of the chest shows considerable extension of the reported pathological area, which now involves about 80 per cent of the left thoracic cavity. There is also bulging of the mediastinum at about its mid-portion to the right.

0.45 mg.; prothrombin time, 13.5 seconds (normal 13.5 seconds); cephalin flocculation, 1 plus; zinc turbidity, 5 units; total cholesterol, 149 mg./100 ml.; total protein, 6.5 Gm./100 ml., with 3.3 Gm./100 ml. of albumin and 3.2 Gm./100 ml. of globulin. Repeated sputum smears and cultures were negative for acid-fast bacilli and fungi, and Papanicolaou cytological studies were considered class II. Repeated second-strength purified protein derivative tuberculin skin tests were negative. The electrocardiogram, liver biopsy, venous pressure, and circulation time were within normal limits.

*Hospital Course.* In view of the patient's chest roentgenograms, negative purified protein derivative skin tests, and other laboratory findings, a presumptive diagnosis of aortic aneurysm was made, with further studies being anticipated to rule out neoplasm.

On various fluoroscopic examinations, the mass did not pulsate. The mass displaced the trachea slightly posteriorly, in addition to pushing it to the right. Numerous tomographic studies were suggestive of, but not conclusive for, neoplasm. No calcium deposits were demonstrated. An esophagram revealed posterior compression and deviation of the upper half of the esophagus. Results of cerebrospinal fluid examination were within normal limits.

On March 22, 1957, angiocardiography was attempted. The contrast medium was not demonstrated in the cardiac chambers or the aorta. The patient refused a repeat examination. Studies of the upper gastrointestinal tract and colon by barium revealed no abnormalities. On April 3, 1957, bronchoscopy revealed paresis of the left vocal cord. The carina was sharp and movable, and the trachea was considered to be apparently compressed from behind. No abnormal masses were seen.

Repeated roentgenograms of the chest and tomograms revealed a rapid increase in the size of the mass. In the absence of any proof of an aortic aneurysm, the mass was considered to be a neoplasm. The patient refused a thoracotomy. He followed a progressively downward course, complicated by the development of a superior vena caval syndrome. He died May 14, 1957, three months after admission.

Post-mortem examination revealed a thymoma with massive compression of the right and left lungs and compression of the trachea and esophagus. The chief findings were limited to the thoracic cavity. A rubbery, grayish white mass occupied the entire superior mediastinum, compressing the surrounding structures, including the posterior and anterior portion of the inferior mediastinum, with almost complete enclosure of the heart. The mass extended laterally, compressing both lungs, especially the right. No bony infiltration was noted. The parietal surface of the pericardium was adherent to the mass. However, the pericardial cavity was free and clear.

The primary cause of death was malignant thymoma, with pulmonary, esophageal, and tracheal compression. Microscopic sections of the thymoma revealed it to be carcinomatous

## DISCUSSION

The finding of an anterior mediastinal mass warrants a careful and complete work-up in an attempt to establish a diagnosis. This should include lateral and oblique chest roentgenograms, fluoroscopy with barium swallow, bronchoscopy, laboratory studies, and a cardiovascular survey. Angiocardiography may be necessary to establish the position of the mass in relation to the heart and great vessels. If the diagnosis of anterior mediastinal tumor is made, or if there is reasonable doubt as to the exact nature of the mass, there is indication for exploratory thoracotomy with removal of the tumor.

Morbidity and mortality rates from surgery in the uncomplicated case are relatively low, but if invasion of the neighboring structures has occurred, increased risks are assumed in any attempt to extirpate the tumor completely. These risks are justifiable, since no other successful method of treating these tumors is yet apparent. The case presented stresses the difficulty in making the diagnosis of thymoma and the apparent need for thoracotomy at an early date if other diagnostic procedures are unavailing.

## SUMMARY

A case of malignant thymoma is presented, and the advisability of early thoracotomy is stressed, if other diagnostic procedures are not revealing. There are no clinical or roentgenological signs to differentiate accurately between the different types of thymoma. Exact diagnosis depends on microscopic study of tumor tissue that may be accessible to biopsy. While thymomas originating from lymphoid tissue are more sensitive than thymic carcinoma, at present no cure has been obtained in either group by any method except surgical extirpation.

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# The Sun Queen*

*Félix Martí-Ibáñez, M.D.*

PROFESSOR AND DIRECTOR OF THE DEPARTMENT OF THE HISTORY OF MEDICINE,
NEW YORK MEDICAL COLLEGE, FLOWER AND FIFTH AVENUE HOSPITALS;
EDITOR-IN-CHIEF OF MD MEDICAL NEWSMAGAZINE
NEW YORK, N. Y.

Sun and water are the oldest curative agents. Since time immemorial, they have put new life into frozen limbs and have abated the fires of fever in man and beast.

In no other country perhaps were sun and water so important as historical factors as in ancient Egypt, that "gift of the Nile," in Herodotus' words, "Egyptians being all those who drank of its waters."

The periodical inundations of the sacred river compelled the Egyptians to become versed in mathematics, geometry, and jurisprudence, in order to be able to delimit anew the boundaries of their lands when washed away by the Nile. Likewise a gigantic bureaucracy had to be organized to record the changes caused by the floods. Water to the Egyptians was as vital economically as therapeutically.

The sun, however, was even more important. To the Egyptians, dwellers in a sun-parched land, the sun was a venerated deity known as Ra. The cult of the sun-god developed in Egypt, where six thousand gods crowded the religious pantheon, indicating that to the Egyptians the Beyond was the most important thing, their home on earth being but a transient rest and the tomb the chief dwelling place of man. The story of how a bold King, Amenhotep IV, established the monotheistic cult of the sun-god in opposition to the ruling polytheism and how his consort Nefertiti came to be Queen of the Sun lies like a delicate, still fragrant rose pressed between the yellowed pages of the book of History.

Some relics of the glory of her ancient civilization still endure in modern Egypt. The pyramids, huge paperweights clamping down the desert so that it shall not be swept away by the sirocco, and the Sphinx, surrounded by crowds of sightseers, still stand "like two indestructible film stars signing autographs." But the most beauteous symbol of all is the bust of Nefertiti, who after more than three thousand years still bewitches us with her veiled gelatinous smile.

Nefertiti was wife of Amenhotep IV, whom Breasted called "the first individual in the history of mankind" and Sigmund Freud, "a remarkable and unique man, worthy of the greatest interest." Amenhotep IV (c. 1375–1350 B.C.) belonged to the XVIIIth Dynasty, when Egypt became a world power, and during his 17 year reign he achieved an extraordinary politico-religious feat—the establishment of a "heliotherapic" cult, with the sun as "official" source of health, life, religion, and beauty. In this rare enterprise he was supported by Nefertiti, whom he wedded when he was 12 and she 10, a shy girl with a profile like a gazelle in flight, whose bust at Berlin's Dahlem Museum is, together with *La Gioconda*, the subtlest interpretation of the feminine enigma.

* These editorials are full-length versions of editorials originally published in *MD* Medical Newsmagazine. "The Sun Queen" appeared in May 1958 *MD*, ". . . Give Me of Your Dreams," in June.

From childhood Amenhotep was an ardent devotee of Ra, the sun-god of Heliopolis, but still more so of Amon, another sun-god of later origin regarded as an incarnation of Ra, particularly in his manifestation of Aton, which was the solar disk visible to the human eye, considered by Amenhotep as the visible source of life, growth, and action.

Under the young Pharaoh's dynamic initiative, temples to the sun flourished everywhere. So much did the sun obsess him, that he changed his name Amenhotep IV (which dedicated him to the god Amon) to Akhenaton or Ikhnaton (glory of the sun Aton). The priests of Amon, who already viewed with cold eyes the Pharaoh's heretical tendencies, were horrified when with unprecedented audacity he broke with millenary tradition and transferred his residence from priest-ridden Thebes to Akhet-Aton (Aton's horizon), halfway between Memphis and Thebes (now Cairo and Luxor). So carried away by the reformation impetus was Akhenaton that he decided there could be only one god in heaven just as there was only one Pharaoh on earth, he had the name of Amon removed from all monuments and papyruses, he dismissed the priests of Amon, and he refused to be considered as a god, proclaiming instead the monotheism of Aton, the disk of the sun.

Akhenaton was barely thirty years old when he died, and his politico-religious revolution died with him, though according to Freud it was revived by an Egyptian called Moses, who transmitted to the Jewish people a monotheistic religion founded on Akhenaton's solar cult.

In addition to this monumental political exploit, Akhenaton stimulated the Amarna period of Egyptian art, during which, in contrast with the preceding agoraphobic, hieratic art, artists were authorized to paint what they *saw*. A product of that period was the bust of Nefertiti, the Sun Queen, whose sweet, shy grace softened the years of surgery and cautery during which Akhenaton wrought his bold reform.

Nefertiti apparently was the daughter of Amenhotep III, Akhenaton's father, and an Indo-European princess of his harem, which would make her a half-sister to her own husband. That explains why on Akhenaton's death, Nefertiti sought an alliance with an Indo-European prince of her own race. This was looked upon as treason, and she was assassinated. The mummy of her body, slender as a wheat stalk, has never been found.

Proud of his gentle companion's beauty, the Pharaoh often allowed artists to depict them together. In art Akhenaton appears as a brachycephalic adolescent with sensitive features, dreamy eyes, and a flaccid pot-bellied body. At his side, both of them bathed in the rays of Aton the sun, is always Nefertiti, her features delicate, her contours fleeting like the reflection of the moon on the Nile.

Perhaps Akhenaton—this is my own personal hypothesis—suffered from rachitism, as his iconography suggests, and that may be why the sun meant so much to him biologically. In any case, he established the sun as a symbol of health and purity, creator and preserver of human life, this being "a portentous anticipation of present-day scientific concepts regarding the effect of sunlight," as Freud said.

Of the singular medico-religious experiment by this Pharaoh, the bust of Nefertiti remains as its symbol. Lofty and dreamy her brow, a grain of sun glowing in her

eyes, her lips parted in a half smile–half kiss, her neck swanlike, the Sun Queen from among the mists of antiquity still casts a ray of sunshine upon us, justifying the meaning of her name Nefertiti—"The Beautiful One Has Come."

—*Félix Martí-Ibáñez, M.D.*

## " . . . Give Me of Your Dreams"

Art and Medicine down the centuries have virtually been parallel excavations in the gigantic quarry of Civilization. Like artists, physicians too are children of Apollo, god of Art and Medicine. Art and medicine have often combined in the person of the physician, perhaps because medicine, which is professionally a service, must be creative if it is to yield its maximum harvest. This may be why physicians, artists, and philosophers have always enjoyed one another's company, as illustrated by Plato's immortal *Symposium*, so brilliantly illuminated by the thoughts of the physician Eryximachus.

For several years now we have been giving much thought to the intimate correlation, still inadequately explored, between artistic trends and medical progress. That as a rule medical novelties in any epoch appear subsequently to artistic innovation is as much a fact, though unnoticed by many, as the parallelism between the arts and the structure of medical learning in any one period. Let us review briefly some of the correlations at different moments of history that we have observed.

Seeking to defeat amorphous nature, where there are no straight lines, ancient Egypt created an art of pyramids and colonnades (optical crutches for the Egyptian eye) that was agoraphobic, funerary, geometric; likewise, her medical systems were rigid and monolithic. These systems obviously based their concept of a "canal" carrying the blood through the body on the water-bearing canals that were so vital a factor in Egypt's daily life. By contrast, Greek art was a noble craftsmanship of blue skies and open seas. No longer mere dwellings for gods, temples like the Parthenon, for instance, were wide open places accessible to both the sun and all people. And so also was the philosophy of Greek physicians—wide and open, bathed by the sunshine of Hippocratic thought.

Byzantine art was precious and full of mannerisms. Unable to venture into space in a city bristling with gilded domes, as Constantinople was, escape was sought in time, through workmanship that demanded the greatest patience and application, such as illuminated miniatures, stained glass, and enameled jewelry. Similarly, Byzantine medicine fled into time, replacing "spatial" exploration of the patient by the compilation of ancient learning. Arabian art shunned the representation of the human form, favoring instead arabesques and floral designs on their majolica ware, tapestries, and rugs; in surgery, they refused to cut into the body with the scalpel, preferring cautery instead. In medieval monasteries they practiced "library medicine," dogmatic and heavy with the dust of Galenism, a medicine that was "bidimensional," like the altarpieces, paintings, and allegories of the pre-Raphaelites.

In the Renaissance, with Leonardo da Vinci's *saper vedere*, with the cult for the naked form and the craving to explore the human body, which paralleled the craving

to explore the unknown lands beyond the seas, art and medicine were united once more in the incomparable work of Vesalius. For Benvenuto Cellini the object of painting was "to paint properly a naked man or woman." From bodies stripped for dissection da Vinci derived inspiration for his fine drawings, as did Michelangelo for the colossi he painted in such felicitous poses on the ceiling of the Sistine Chapel. Similarly, Vasari's artistic biographies are comparable in their psychobiographical approach to the *observatio*, or Renaissance clinical records (which replaced the medieval *consilia*), made for instance by Fernel (whose *magnum opus* has been likened to a Florentine *palazzo* erected on medieval foundations), Montanuas, and Benivieni. Baroque art, the two leading characteristics of which were motion and emotion, expressed in an ornate architecture that was a veritable whirlpool of stone, had its parallelism in the work of the Baroque physiologists, whose studies concentrated on organic "local movement." In fact, while the Globe Theatre in London rang with the echoes of the words "blood" and "heart," which, like an incessant ritornello, constantly recurred in the works of the immortal bard, Harvey in his laboratory not too far away was working on the theory of the motion of the blood. Later, the poetic and philosophical movement in art, impelled by a hunger to visualize the infinite, was reflected in the passion for exploring the infinitely small with the microscope, a craving that had been increasing in the seventeenth century ever since Galileo. In fact, in the quiet town of Delft, Holland, while Leeuwenhoek, a master polisher of magnifying glasses, was investigating the minute structures of the invisible world, his neighbor Vermeer was at the same time depicting the world of the minute in his exquisite paintings. The Enlightenment, founded on the Encyclopedia, had its parallel in the medical encyclopedism of the great medical figures of that age. Again, the positivistic naturalism of the last century was translated into experimental realism in the lectures of Claude Bernard, and Émile Zola, who attended the lectures, transmuted it into *L'Assommoir* and his other realistic novels.

In our own times, Seurat's pointillism, which split light into colored dots on canvas, ran parallel to the discoveries on the refraction of spectrum light passing through a prism and the advances in ophthalmology. The new concepts of physics on form and light were born at the same time as the impressionism of Manet, Monet, and Pissarro, who depicted their subjective impressions of the outer world; the psychological expressionism in Van Gogh's tortured paintings ran parallel with Freud's exploration of the subconscious; the fragmentation of the human form and penetration of its deeper planes by radiology after Roentgen coincided with Braque's and Picasso's cubism; atomic physics disintegrated the universe, and so did the work of Dali and other abstract painters; Kandinsky's nonobjective art and the surrealism of Miro, Tanguy, Klee, and da Chirico are mirrored in the advances since Freud in psychiatry and psychology, just as the modern concept of a single space-time continuum had its counterpart in Picasso's later work depicting figures simultaneously full-front and profile, thus introducing a new time dimension into the until then spatial world of painting.

This series of intriguing correlations between universal, historical attitudes in medicine and in art does not mean that one has been responsible for the character

of the other in any particular epoch. Sometimes this has been so, but generally both have been merely facets of the civilization of their time. Artists and physicians as men have been influenced by the cultural and social breezes of their times, which they reflect in their artistic work or medical concepts. The modern physician should remember this correlation, for it will help him to understand philosophically his scientific concepts and even to anticipate new trends in medicine simply by observing the path chosen by the rest of the culture of his time.

W. J. Mayo has beautifully expressed this unity of the real with the imaginary, of science with art, in his words inscribed on a stained-glass window at the Mayo Brothers House: "Take of my experience but give me of your dreams."

—*Félix Martí-Ibáñez, M.D.*

## New Medical Uses for Radioisotopes

Several promising new uses for radioisotopes are outlined in a report recently released by the Atomic Energy Commission. Developments include a new renal function test using Diodrast labeled with iodine-131. Radiograms of more than 400 patients with a variety of renal and urinary tract disorders show the test is highly accurate in diagnosis of impaired renal function. The procedure, described as simple to perform, is expected to have considerable merit as a rapid screening test. In the field of tuberculosis, tracer studies have demonstrated that both isoniazid and PAS readily penetrate caseous lesions, according to the report.

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## FOREWORD: A New Policy

The objective of the QUARTERLY REVIEW OF OPHTHALMOLOGY is to bring together in one publication a concise record of current happenings, both national and international, in this field. Selection and editing of material are designed to prove informative to *the entire medical profession* as well as to ophthalmologists. Manuscripts for the QUARTERLY REVIEW OF OPHTHALMOLOGY should be submitted to Dr. Arnold S. Breakey, Ophthalmological Foundation, 111 East 59th St., New York, N. Y.

## Ophthalmic Wanderings

*Eye Care Is Everyone's Business.* The responsibility for the conservation of sight cannot rest solely with the medical specialist, states Kathleen Nugent Schafer,[1] associate professor of nursing at Cornell University. Eye care is the responsibility of all public health workers, nurses, and physicians alike. It cannot rest with the ophthalmologist alone because prevention must be practiced long before a person has symptoms that lead him to seek expert attention. Health workers can clarify unfamiliar terms and explain the complex structure of the eye to the lay public. There is widespread confusion and misunderstanding on the part of the public concerning the proper specialist to consult about the care of the eyes. Miss Schafer points out that many people do not understand the difference between optician, optometrist, and ophthalmologist. The optician grinds and fits lenses, while the optometrist can prescribe glasses but cannot treat eye conditions. An ophthalmologist on the other hand, is first of all an M.D. He has had intensive medical training and experience in diagnosis and treatment of diseases of the eye. He is allowed by law to use eye drops and medicine and to perform surgery of the eye.

It is further pointed out that a large number of people respond.to radio advertising of aids to better vision. They must be made to understand that conditions of the eye cannot always be remedied simply by the purchase of a pair of glasses or a change of lenses. Another source of danger are eye drops that have been left in a medicine cabinet for many months. Medications that were useful in the past cannot always be used currently.

Miss Schafer also makes the point that there is a great tendency to put things off and to reject obvious eye symptoms. Despite the fact that the average person thinks the loss of vision is a major catastrophe, he is careless in giving early attention to eye difficulties.

All health workers should recognize some cardinal danger signs. Frequent headaches associated with reading, constant dull pain in the eyes, blurred vision, spots before the eyes, rings around lights, changes in visual acuity are all signs of affected eye function. Frequent changes of glasses, especially in persons older than 40, may be suggestive of glaucoma.

First-aid measures necessary in the event of eye injury are stressed by Miss Schafer. The need for immediate flushing of the eye with water when an acid or other irritating substance has been accidently introduced is brought out forcibly. Such treatment can take the radical form of immersing the head in a bucket of water. The presence of a foreign body on the cornea always necessitates referring the patient to an eye physician.

Nurse teachers and regular school teachers should be alert to changes in the vision of school children during the year. Rapid visual changes in the school age child might suggest the possibility of brain tumor, progressive nephritis, or, occasionally, behavior problems. Emphasis on good nutrition is equally helpful in eye care.

One of the most tragic areas of neglect in the young is strabismus, says Miss Schafer. Proper care of the child with a squint can be instituted at any age. It is never too early to do something. Prolonged strabismus can cause the loss of the vital ability

to focus the eyes together. Once this pattern becomes deep-seated, vision may be irrevocably damaged.

The question of the child's wearing glasses is an age-old problem with which the medical profession must help the parents. The wearing of glasses need not be a serious handicap to normal play, and the vogue for attractive frames today makes glasses more acceptable to teenagers. It is necessary to educate the public as to when glasses should or should not be worn.

*New Drug for Treatment of Cataract.* In a recent edition of the bulletin of the National Society for the Prevention of Blindness,[2] the use of calsulfhydryl in the treatment of cataracts, retrolertal fibroplasia, and diabetic retinopathy is discussed. The successful use of this drug has been widely publicized. Fifteen ophthalmologists, mostly in the Midwest and West, state that they have known patients who had been on the drug for from one to two years and had seen no beneficial effects. It was also noted that cataract advanced despite treatment with the drug. It was the consensus of opinion that the optimistic claims for calsulfhydryl in the treatment of cataract could not be substantiated.

*The Rise and Fall of Retrolental Fibroplasia.* Retrolental fibroplasia is virtually a disease of the past.[3] During the past 10 years, retrolental fibroplasia has blinded approximately 1000 children in New York State. In 1948, 62 cases were reported. With better case-finding, 117 were reported in 1950 and 169 in 1951. The frequency of the disease reached a peak in 1952, with 176 cases in New York State. By 1954 it was discovered by Ashton of England that the cause for the condition was excessive oxygen given to premature infants. By the end of that year only 51 cases of retrolental fibroplasia were reported. In 1956 there were only 3 cases. With the control of the use of oxygen at levels no higher than 45 volumes/100 ml., it appears that retrolental fibroplasia need no longer be a cause of blindness in infants.

*Energy Output in the Postoperative Patient.* The age-old problem of whether a patient expends more energy using a bedpan or being allowed bathroom privileges received a factual boost by the work of Weiss and Karpovich.[4] It has been the custom for many years to require postoperatively that a cataract, glaucoma, or retinal detachment patient be confined to bed for two to five days, during which time he would use a bedpan. Weiss and Karpovich have determined that it requires approximately 4.7 calories of energy per minute to use a bedpan, whereas it requires about 2.5 calories/minute for a very slow assisted ambulation to the bathroom. It therefore becomes apparent that almost twice as much energy is consumed in using a bedpan. These facts may in some small measure break down the old concept that we are affording our patients greater rest and lack of strain by confining them to bed during the postoperative period after eye surgery.

*Evaluation of the "Phosphenator" in the Detection of Glaucoma.* In an article published in the *Journal of the American Optometric Association*,[5] Leo Lipetz evaluates the use of the phosphenator in the detection of glaucoma. Unsupported claims have extolled

the efficacy of the detection of glaucoma by the phosphenator technique. This is a screening instrument that employs a pulsating electric current to stimulate a colored ocular phosphene. It is claimed that the perception of a red phosphene is abnormal and diagnostic of glaucoma. Four hundred and one eyes were studied for their response to this pulsating current. It is apparent that there is no correlation between the colors seen and presence or absence of disease, including glaucoma.

*Arnold S. Breakey, M.D.*
*New York, N. Y.*

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## History of Ophthalmology to Be Published

*A History of Ophthalmology* by George E. Arrington, Jr., M.D., will be published in September by MD Publications, Inc., as part of their series of *MD Monographs on Medical History*. The ophthalmology monograph is a study of the development of the "ophthalmological mind" throughout the history of civilization. While the achievements of therapeutic and diagnostic techniques are cited, it is their relationship to concepts of natural science, biology, evolution, philosophy, and human culture generally that is emphasized.

The book attempts to guide the ophthalmologist to the sources of concepts that regulate his daily clinical functioning. He is introduced to the great thinkers who established through both reasoning and experimentation the basic ideas of visual function and dysfunction on which the science of ophthalmology is founded. Ophthalmology is carefully related to medicine generally, and their roles of interdependence and interaction are shown.

Dr. Arrington is Associate in Ophthalmology, Medical College of Virginia, Richmond, and Attending Ophthalmologist, Medical College of Virginia Hospital, Richmond Eye Hospital, Retreat for the Sick Hospital, and the Richmond Memorial Hospital.

## The Vitreous Humor

IMPORTANT IN RELATION TO OTHER EYE DISEASE. Although the vitreous humor is the largest constituent of the eyeball, extensive investigation of this structure is only recent. Two reasons for this recent attention are an increased clinical interest in vitreous alterations and the demonstrated general importance of hyaluronic acid, a constituent of the vitreous. The main investigative techniques consist of clinical observations, in vivo animal physiological experiments, and in vitro microscopic and chemical studies.

The high incidence of clinically visible senile alterations in this structure has been well documented. These changes of liquefaction, shrinkage, and adhesion probably play a significant role in the etiology of senile retinal detachment and lightning flashes. The formation of many retinal holes is undoubtedly related to the presence of overlying vitreous traction bands, although the pathogenesis of these bands is not clear. After ocular surgery, the state of the vitreous is an important factor in the postoperative course and ocular prognosis. The use of vitreous transplants for large opacities or after extensive vitreous loss is being evaluated.

A DIFFICULT TISSUE TO STUDY. In animals, the demonstrated importance of the vitreous reservoir in the dynamics of blood-aqueous exchanges has led to a revision of the transfer rate estimates of several substances. In general, transfer across the blood-vitreous barrier is slower than across the blood-aqueous barrier. Although studies of the swelling properties of this gel have indicated that the degree of swelling is not significant over a physiological pH range, the subject remains controversial. Experimental liquefaction has been produced by the enzyme hyaluronidase, ultrasonic vibration, and electromagnetic radiation. Physiological studies on the vitreous are often complicated by multiple boundary effects of the various surrounding tissues.

FURTHER BIOCHEMICAL STUDY WILL HELP THE CLINICIAN. Most in vitro microscopic studies have demonstrated a fibrillary structure, although several investigators have suggested

that these structures are artefacts or zonular fiber contaminants. Three major chemical constituents are the soluble proteins, the residual protein, and hyaluronic acid. The existence of other neutral polysaccharides has also recently been demonstrated. The soluble proteins are in general similar to the serum proteins, while the residual protein is a fibrous collagen that forms a structural meshwork in vivo. There are at least two different components in extracted residual protein, and there is evidence to suggest that the neutral polysaccharide represents a carbohydrate moiety of the collagen fibers. The presence of hyaluronic acid is necessary for the stability of the fibrous protein meshwork. Alterations in the polymerization and water-binding capacity of this polysaccharide may well be the chemical basis for many clinically observed changes. In animals, the concentration of hyaluronic acid varies with age, decreasing generally with increasing age. The distribution of this substance within the vitreous is not consistent with its production by the ciliary body. The source and metabolism of hyaluronic acid may be related to cells found in the cortical layers of the vitreous. Further biochemical investigation should prove most useful to the understanding of several clinical conditions.

Ralph Z. Levene, M.D.
New York, N.Y.

## New Magnifying Lenses

Recent improvements in devices and methods to aid persons with low vision were reported at the 1958 Sight-Saving Conference held in Philadelphia March 12 to 14. Dr. Bernard C. Gettes, director of the Wills Eye Hospital low vision department, described new magnifying lenses that fit standard metal or plastic frames but provide a "larger and clearer field than ordinary spherical lenses of similar power."

Called Conoid Lenses, the new optical aids are made of crown glass and range in power from 15 to 100 diopters, according to Dr. Gettes. The strong new devices reduce "aberrations which make ordinary spherical lenses unsatisfactory," Dr. Gettes said. Patients who have tested the lenses report they see more words and letters more comfortably than with other devices, he added.

## Questions and Answers

**Q.** *I am a myope and I wear bifocals. I had intended to obtain contact lenses. What will I wear for close work?*

**A.** Most persons of presbyopic age who wear contact lenses must wear bifocal lenses for close work. They are usually worn in addition to contact lenses whenever close work is performed. The upper segment of these glasses is made of plain glass and the bottom contains the usual "addition for near."

In the near future there may be a surprise in store for the presbyopic person who wears contact lenses. The modern contact lens covers only the cornea and rotates on the eye freely. Therefore, there was no way of inserting a segment, as is done in bifocals worn in the frame. However, one of the companies manufacturing contact lenses has apparently found an answer to the problem of bifocal contact lenses: The reading portion is placed in the entire periphery, thus overcoming the difficulty arising from the rotation of the lens.

Although it is too early to draw any definite conclusion at the present time, it should be known before long whether this new bifocal construction will be practical for the average contact lens wearer.

**Q.** *I recently delivered a child both of whose parents are myopic. They were anxious to know whether the child will also be myopic, and at what age this can be determined.*

**A.** Hereditary origin of myopia has been supported by recent investigations. Myopia seems to be familial in many cases. It apparently passes from father to daughter or from mother to son. When both parents are myopic (as in your case), about 60 per cent of children are ususally myopic. It is possible to examine an infant's eyes. Obviously the tests are conducted without the child's cooperation. Even if no glasses are prescribed at such an early age (usually never before the age of 1 year), the condition of the eyes can be observed and the extent of nearsightedness, if any, determined.

**Q.** *Does diplopia always indicate paralysis of extraocular muscles?*

**A.** Most cases of binocular diplopia result from paralysis of one or more extraocular muscles, but several other causes are known. Displacement of the eyeball as seen in exophthalmos may lead to diplopia, although in such cases muscle paresis is frequently encountered in addition to the displacement. Diplopia may also be found in convergence paresis.

It is advisable to check whether diplopia persists after one of the eyes has been covered. In such a case the examiner is faced with a monocular diplopia, which may be caused by subluxation of the lens, incipient cataract, or keratoconus.

Some authors described patients whose diplopia could be explained only as a manifestation of hysteria.

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Note: Questions from our readers are invited. Address George Z. Carter, M. D., Ophthalmological Foundation, 111 East 59th St., New York, N. Y.

**Q.** *What is the significance of spots before the eyes that some patients frequently complain of?*

**A.** Their significance can be determined only after careful examination by an ophthalmologist. Some of these visual phenomena are caused by remnants of the fetal vascular system of the eye or by condensation of the vitreous or else by red blood cells moving through small retinal capillaries. All these have no pathological significance. Other spots may be due to inflammatory exudation into the vitreous, as in uveitis, or may be caused by hemorrhage. Larger spots are usually seen after vitreous separation, which is the result of progressive shrinkage of the vitreous leading to its complete separation from the innermost retinal layers. Finally, seeing of spots may, at times, be the first sign of retinal detachment. It is therefore advisable to consult an ophthalmologist whenever spots appear before eyes.

**Q.** *An infant scratched her eye with a fingernail. The scratch healed but ever since then she has been waking up with sharp pain in the eye, followed by tearing and redness of the eye.*

**A.** This sounds like a recurrent erosion of the cornea. The injury heals temporarily, but later, severe pain is experienced in the eye, usually in early morning hours. One of the explanations of this condition is that after the lids have been closed for many hours the tears become relatively hypotonic, which leads to corneal edema.

The use of oily drops or bland ointments before retiring at night may be helpful. In more serious cases, cauterization and removal of corneal epithelium may be necessary.

*George Z. Carter, M.D.*
*New York, N. Y.*

## Postgraduate Courses for Specialists

The Institute of Ophthalmology of the Americas of the New York Eye and Ear Infirmary announces a series of postgraduate courses for specialists to be given from Nov. 3, 1958, to Jan. 9, 1959.

Courses will be given in the following subjects: anomalies of extraocular muscles, including ptosis; aniseikonia; biomicroscopy; cataracts; clinical bacteriology; complications of ophthalmic surgery; electrophysiology of the eye; glaucoma; gonioscopy and tonography; keratectomy and keratoplasty; lachrymal sac surgery; medical ophthalmoscopy; near ultraviolet biomicroscopy; ocular allergy; ocular biochemistry; ocular microbiology; ocular neuro-ophthalmology; ocular photography; ocular radiology; ocular trauma; ophthalmoscopy; pathology; perimetry; plastic eye surgery; pleoptics and macular function testing; psychosomatic factors in ophthalmology; radioisotopes in ophthalmology; refraction; and retinal detachment.

Further information regarding the courses may be obtained by writing to Mrs. Tamar Weber, Registrar, Institute of Ophthalmology of the Americas of the New York Eye and Ear Infirmary, 218 Second Avenue, New York 3, N. Y.

CASE REPORT

## Disciform Keratitis after Epidemic Herpes Zoster

A 52 year old woman had had right herpes zoster ophthalmicus nine months previously. She was treated by roentgen-ray therapy and local applications, with amelioration of symptoms. There was some ocular involvement, as she experienced some pain in the eye and photophobia during and after the attack.

Three weeks prior to the patient's first visit to the office she developed burning, blurred vision, discomfort, tearing, photophobia, and a drooping of the lid of the right eye.

Examination revealed pitted scars of the skin corresponding to the distribution of the right ophthalmic division of the fifth nerve. The right lid drooped but could be closed normally. There was a moderate conjunctival redness but no circumcorneal ciliary blush. Visual acuity of the right eye was correctible to 20/40. The left eye was normal with visual acuity correctible to 20/20. Of particular interest was the presence of a round opacity of the inferior temporal cornea about 3 mm. in diameter. Under slit-lamp examination, the cornea showed epithelial edema with some desquamation as evidenced by staining areas. In the corneal stroma there was present a marked interstitial haze varying in intensity. There was a prominent discoid-like increase of thickness in the corneal stroma. Anterior to Descemet's membrane, vascularization was present, extending through most of the lesion. No aqueous flare but an occasional cell was seen.

A diagnosis of disciform keratitis was made, and the patient was prescribed topical 0.5 per cent prednisolone solution four times daily. The medication was continued for one month. At the end of this period the cornea had returned to a near normal appearance with regression of the vascularization. Some residual scarring persisted, and the patient was comfortable with vision correctible to normal.

Disciform keratitis most commonly results from herpes simplex or trauma. It rarely occurs as a late complication of herpes zoster. It may be produced by vaccinia or varicella virus. In many instances the etiology is obscure.

Dendritic keratitis is differentiated from other types of keratitis by the characteristic disciform configuration of the cornea when examined in cross section by the biomicroscope.

The therapy of disciform keratitis is dependent on the etiology of the lesion and the presence or absence of coexisting ocular disease. If the etiology is unknown, the treatment is empirical.

*Dahar Cury, M.D.*
*Huntington Park, Calif.*

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Editor's Note: This section is devoted to case histories of typical daily problems in the eye field. It is designed to help the reader toward a better understanding of diagnoses and treatment in ophthalmology.

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